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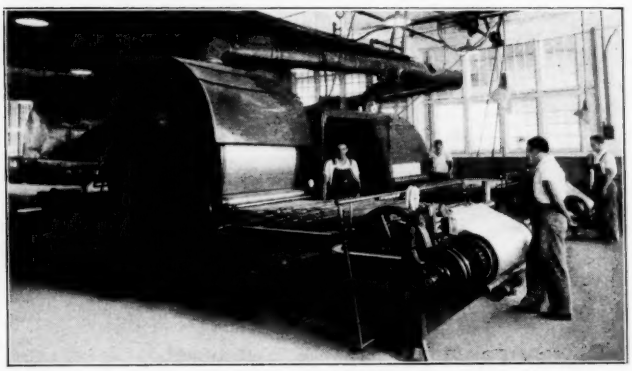

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VOLUME XX **AUGUST 3, 1931** **NUMBER 15**

Textile Specialties and Textile Progress

By **ALAN A. CLAFLIN**

"Every new specialty means the education of a new lot of buyers and this education is a cumulative process, and consequently the late-comer must face a more and more sophisticated clientele. New specialties will come and the criterion of their importance to the textile industry will be their intrinsic merit. If they really contribute an improvement to some textile process, they should be welcomed under what ever name they come, whether truly a chemical compound, an entirely synthesized word, or a vague compromise between the two."

IN the textile industry there are many opportunities for specializing, and at a first glance it might be inferred that this paper from the title would have to do with special products of the industry. Fabric leather and fabric fur, fabric writing paper and even fabric turf for miniature golf courses may be appropriately termed textile specialties. To the reader of the AMERICAN DYESTUFF REPORTER there will be no ambiguity. He will understand textile specialties to mean that numerous and ubiquitous class of chemical products which while not of themselves exclusively performing the major chemical operations of the textile industry, that is, bleaching and dyeing, yet (according to our point of view, whether buyer or seller) "slightly if at all," or "marvelously" assist those operations. Naturally the minor chemical operations like wetting out and the chemically vague process of finishing can be entirely accomplished with specialties. Now concerning this class of compounds, the textile specialties, there may be, as already indicated, two points of view. While much has been written of these products individually, the literature of specialties is one of the most interesting phases of the subject. Collectively, economically, or one might say philosophically, giving the word its broad, rather than its derivative meaning, specialties have not been given the consideration their commercial magnitude warrants. It is entirely probable that the skeptical opinion that considers all specialties "fakes" or as one distinguished mill chemist expressed it "devices for making the dyer's art more expensive" is as equally prejudicial and erroneous as the propaganda of the purveyor who has a proprietary panacea for every evil the fiber is heir to from the time it leaves the sheeps back or the cotton boll until it adorns my lady's back, or, it would be more modernistic to say, all but my lady's neck. Anyway let us look at the subject with an open mind. Let us honestly inquire whether specialties are a necessary evil, and if so, what makes them necessary, or, if they are a disguised blessing, why the disguise? Is the growth to commercial importance of textile specialties a sign of progress or evidence of retrogression? Does their development constitute a technical spur or an economic book-worm to the textile industry? Textile specialties carry in the first place special, that is, proprietary names. Under its correct chemical name a product ceases to be strictly speaking a specialty, and is a new textile reagent or drug. Oftentimes in the economic aspect there is very little distinction between a new product that is introduced under its own name and one that is introduced as a specialty; in both cases the price is as near as possible what the traffic will stand. If it is possible by reason of patent rights, exclusive or particularly favorable raw material situation, and sometimes because of possession of certain essential manufacturing secrets, to feel fairly secure of a monopoly of the market, once a market is developed, it is the usual practice to offer a product under its own name. The primary reason for such procedure is the lessened sales resistance. By offering a product under its proper chemical name prospective buyers know at once whether the product is novel or not, and assuming that it is, the specific arguments recommending its use are reinforced by the buyers own chemical knowledge.

Proprietary Name May Indicate Lack of Patentability

On the other hand, if there is no patentable novelty, no essential basis for expecting a monopoly, a proprietary name may insure the introducer of a novelty essential primacy in any market he may create. While a special name does engender sales resistance, it also establishes a property right, and gives the holder the initiative and forces rival products to the claim of just as good. Frequently, and this is particularly true when a firm is so well established that sales resistance is of minor moment, both the protection of patent and proprietary name is invoked, or it may be that the patent is on the use and the proprietary name is felt to aid in identification. In such cases it is customary to state, as a means of overcoming sales resistance or circumventing those people who have established a taboo on unknown specialties, what the compound is. Statements as to identity may have all degrees of definity. Indeed one often feels that Robert Louis Stevenson's famour dictum "Like all good liars he told as much of the truth as he felt reasonably sure his listeners already knew" is the guiding motto in inducing disclosure rather than particularly a desire to enlighten the consumer. There is little to choose between a saying that so and so is a hydrogenated aromatic compound, or that such and such are halogenated hydro-carbons, and saying that extensive chemical research has resulted in the invention of a product that does so and so with no word of its composition. Since the price of a new product is dependent rather on the price of the product it is to replace, rather than on its own production cost, it is obviously of little moment whether the product is offered under its proper chemical name or a proprietary one so far as cost to the industry is concerned. The only substantial reason why a new product offered under its own name should have preference over a similar one offered under a proprietary name is that the correct name is prima facie evidence of novelty. With a proprietary name the burden of proof is on the vendors of the product to either convince of novelty by disclosing as much or as little of chemical identity as is necessary, or back their claims of merit by assertions of the value of practical tests and deprecation of laboratory reports. Without adequate disclosure of chemical identity it is obviously up to the technical staff of the consumers to determine if there is any real merit in the proprietary product. In many instances firms will claim this is no part of the duties of their technical staff and that there is plenty of routine work for a mill laboratory without fussing with specialties. It has been well said, however, that when a scientist ceases to have curiosity he ceases to be a scientist, and when a mill laboratory ceases to be inquisitive about new products and processes, it is an evidence of technical sclerosis, it cannot be expected a man can see for others if he does not care to see for himself.

Educational Value of Specialty Analysis

While it is extremely easy to spend too much time in examining specialties, acting as a sieve, to separate the sheep from the goats among them, and there are far more goats than sheep, is an extremely educative process in any laboratory. Indeed it is probable that the greatest benefit that the selling of specialties confers on the textile industry is the stimulus it gives the laboratory that examines them. With staple products standardized as they are today, and analytical methods likewise standardized, there would be little incentive for exercise of the "Soul of Chemistry," initiative and accuracy in analysis, if it were not for the examination of specialties. The primary objection to specialties is that they are high in price, that they represent an inordinate profit to the vendor, and this profit is conducive of commercial bribery. So far as the price is concerned this, as already seen, is not dependent on the name, a big profit may be realized on a patented novelty; it is up to consumer management to make sure the proprietary specialty really functions in accordance with its proponents claims. Does it improve products, lessen and overcome process troubles and really cheapen production? If it fulfills its claims then the proprietary name is a stimulating challenge to the mill laboratory to see if the same result may not be achieved without paying tribute to the name. For the introduction of a high class specialty it is usually necessary to have technically educated salesmen who are competent demonstrators, and these representatives by their very conversance with the processes their specialty assists, or is claimed to assist, direct the consumers attention to that process. After a visit of one of these men, whether he has been successful or not in his demonstration, he has undoubtedly stimulated interest in that particular process with which he has had to do. A few examples may be cited to show the educative influence of specialties. Malting as a method of freeing fabrics from starch, was about as old as bleaching itself, but had gone out of use with the speeding up of the bleaching process. Concentrated malt extracts and other enzyme containing syrups redirected attention to the malting process. Its merits were proved, and mill chemists not only learned something about enzymes, but they learned incidentally about the determination of residual starch in fabrics and its influence on subsequent processes.

Kier Oils Direct Attention to Cotton Waxes

Concerning kier oils there is probably more divided opinion and doubt about their value than with the diastatic specialties, also the proprietary products have been so repeatedly analyzed that there is little mystery concerning their composition, yet through the initial effort put forward in their behalf the whole subject of cotton waxes has been investigated. Solvent extractions of cotton piece goods have become a matter of routine in many well ordered bleacheries, and the value of a kier oil either proprietary or made on the premises is no longer a matter of some bleacher's guess or prejudiced opinion, but a definite matter of analytical result. Kier oils lead naturally to the more or less allied products, scouring and fulling oils. Surely the investigation of these has led to greater familiarity with the mechanics of the whole cleansing

process. Whatever the opinion of the actual value of proprietary scouring oils, detergence is now known not to be a mere question of the fatty acid content of a soap. Solubility, titer and emulsifying power are considered and scouring oils have contributed their bit with the wetting agents to the knowledge concerning surface tension. Few indeed were the textile chemists to whom surface tension was anything, but a vague recollection of student days until the introduction of certain special wetting agents directed attention to the subject. Now the relationship of surface tension to actual wetting and penetration is being practically studied, and further this leads to knowledge of emulsions. How much of the properties of wetting agents is due to reduction of surface tension of aqueous solutions and how much to reduction in interfacial surface tension between oily or greasy surfaces and water has not been perhaps entirely cleared up, but since wetting agents are so familiar, knowledge concerning this question will not long continue to be hazy. With this knowledge will come further enlightenment on emulsions, and the fact that many of the wetting agents are also emulsifying agents indicates that it is reduction of interfacial tension instead of surface tension per se that is responsible for their efficiency.

Specialties Create Interest in Colloid Chemistry

The interest in emulsions largely inspired by textile specialties that are efficient emulsifying agents leads naturally to the question of dispersions and dispersing agents, and this opens up the whole subject of colloid chemistry. Emulsions or dispersions of wax for water-proofing, synthetic gums, self emulsifying oils, all are textile specialties that turn the textile chemists' thoughts toward colloid chemistry. As a rule solvents have been introduced under their chemical names, but in combination with liquid soaps and sulphonated oils they have contributed their bit toward the lengthening list of textile specialties and surely the energy with which the sale of such specialties has been pushed has increased the knowledge concerning the value of such solvents to the textile industry. Competition in staple products undoubtedly turns the attention of the chemical manufacturer toward the production of specialties. If his competitor is already marketing a specialty, he attributes his competitor's willingness to make low prices to the profits he is making on the specialty, and if his competitor does not have specialties, he believes he can get the jump on him by getting a profitable specialty going first. While at times there may be big profits in specialties, many manufacturers of staple chemicals have had rude awakenings about the cost of marketing specialties. Indeed if the losses were as readily recognized as the profits, it is doubtful if the specialty business would be found to average any more profitable than a staple business. It probably is just as easy to devise an improvement in the production of a staple product, or inaugurate economy in handling that will increase profits as it is to devise and successfully maintain a specialty. Advertising, which is of minor importance when staples are marketed, becomes a major issue when a specialty is concerned as consultation of the advertising columns of any textile paper will show. What then is the future of the textile specialty? Judging by the past they will increase in number and variety, but also they will improve in quality. Every new specialty means the education of a new lot of buyers and this education is a cumulative process, and consequently the late-comer must face a more and more sophisticated clientele. It is no longer possible to mix calcium chloride with starch, ethylene di-chloride with sulphonated oil, cresylic acid with liquid soap and fool any portion of the buyers of textile specialties. If those mixtures are desired and they do have their field of usefulness, they will be bought on as close a margin as caustic soda or acetic acid. New specialties will come and the criterion of their importance to the industry will be their intrinsic merit. If they really contribute an improvement to some textile process, they should be welcomed under whatever name they come, whether truly a chemical compound, an entirely synthesized word, or a vague compromise between the two.

THE SPECTROPHOTOMETRIC ANALYSIS OF A MIXTURE OF THREE DYES

By A. R. Peterson[1] and W. C. Holmes[2]

(198*th Contribution from the Color and Farm Waste Division, Bureau of Chemistry and Soils, U. S. Department of Agriculture, Washington, D. C.*)

Abstract

Satisfactory results were obtained in the spectrophotometric analysis of a mixture of Erythrosine, Phloxine B and Rose Bengal B. The method as outlined is applicable to mixtures of any three dyes with overlapping light absorption.

* * *

SPECTROPHOTOMETRIC methods are exceptionally useful and convenient for the analysis of dye mixtures. Appropriate methods of application for mixtures of two dyes, and for mixtures of three dyes of which at least one component has an appreciable light absorption in a spectral region wherein the remaining components do not absorb light, have been described by the senior author.[3] The investigation described herein was undertaken to afford a test of the reliability of a spectrophotometric method as applied to a representative mixture of three dyes with overlapping light absorptions.

A dye mixture of this type may be analyzed on the basis of its extinction coefficients at three suitable wave lengths. The only data requisite for the purpose are the specific extinction coefficients of the component dyes at the wave lengths in question. The specific extinction coefficients of dyes may be defined as their Bunsen extinction coefficients[4] under specified conditions. As employed herein specific extinction coefficients are defined as the Bunsen extinction coefficients of 1 cm. layers of dye solutions containing 10 parts of actual dye per million parts of solvent.

Specific extinction coefficients may be determined by measuring the Bunsen extinction coefficients of known

concentrations of crude dye in an appropriate solvent, and applying the necessary correction for the actual percentage of dye as determined, independently, by suitable chemical methods.

Having obtained specific data with three dyes, A, B and C, the analyst is qualified to undertake the analysis of a mixture of those dyes. A solution containing 10 parts per million of the dye mixture is prepared in the same solvent as was employed in obtaining the basic data, and the extinction coefficients of this solution measured at three wave lengths. These coefficients may be designated as E_1, E_2 and E_3, measured, respectively, at wave lengths, $m\mu_1$, $m\mu_2$ and $m\mu_3$. Then it is obvious that

$$E_1 = X_1 + Y_1 + Z_1,$$
$$E_2 = X_2 + Y_2 + Z_2,$$
$$E_3 = X_3 + Y_3 + Z_3,$$

where X_1, X_2 and X_3 represent the extinction coefficients of dye A at $m\mu_1$, $m\mu_2$ and $m\mu_3$, and Y_1, Y_2 and Y_3 and Z_1, Z_2 and Z_3 represent the extinction coefficients of dyes B and C, respectively, at the same respective wave lengths. Inasmuch as the ratios of the values of the extinction coefficients of each individual dye at $m\mu_1$, $m\mu_2$ and $m\mu_3$ may be calculated from the basic data previously obtained, and since these ratios remain constant under suitable working conditions, it is possible to solve these equations, obtaining values for X_1, X_2, X_3, Y_1, Y_2, Y_3, Z_1, Z_2 and Z_3. The percentages of the component dyes in the mixture may then be calculated by dividing these values by the specific extinction coefficients of the dyes at those wave lengths.

In order to test this method, the dyes Erythrosine (Color Index No. 773), Phloxine B (Color Index No. 778) and Rose Bengal B (Color Index No. 779) were chosen. The individual samples employed were selected as being truly representative of the dyes in question on the basis of their absorption ratios.[5]

Their Bunsen extinction coefficients were determined in a slightly alkaline aqueous solution containing 10 parts of dye per million parts of 0.002% sodium carbonate solution.

The crude dye samples were analyzed by the color acid method,[6] which has proved exceptionally accurate and reliable at this laboratory. The calculated specific extinction coefficients for the dyes in the specified solvent, obtained thereby, are recorded in Table I.

Three mixtures were then made up with varying amounts of the dyes in question. Solutions were prepared from these in the same manner as that employed in obtaining the basic data on the dyes. The Bunsen extinction coefficients of these solutions were measured at 525mμ, 540mμ and 550mμ. From these measurements the percentages of the component dyes in the mixtures were calculated, employing for that purpose the equations previously outlined and the data recorded in Table I. The results obtained in these analyses are recorded in Table II.

The extreme variation between calculated and actual dye content is 2.0% and the average variation approximately 0.8%.

TABLE I

Specific Extinction Coefficients of Erythrosine (Color Index No. 773), Phloxine B (Color Index No. 778) and Rose Bengal B (Color Index No. 779), in aqueous solution containing .002% Na_2CO_3.

Specific Extinction at mμ	Erythrosine	Phloxine	Rose Bengal
500	0.42	0.40	0.24
510	0.58	0.41	0.33
520	0.93	0.51	0.33
525	1.08	0.66	0.34
530	1.07	0.89	0.44
535	0.86	1.07	0.57
540	0.57	1.09	0.73
545	0.31	0.95	0.87
550	0.15	0.63	0.92
555	0.03	0.34	0.80
560		0.15	0.54
565			0.31

TABLE II

Spectrophotometric Analysis of Mixtures of Erythrosine Phloxine B and Rose Bengal B.

	Mixture No. 1	Mixture No. 2	Mixture No. 3
E_1 (525mμ)	0.68	0.61	0.47
E_2 (540mμ)	0.63	0.71	0.63
E_3 (550mμ)	0.35	0.435	0.51
Per cent Erythrosine (calc.)	(42.3	(26.5	(16.9
Per cent Erythrosine (present)	(43.15	(26.5	(17.3
Per cent Phloxine B (calc.)	(27.3	(41.55	(25.0
Per cent Phloxine B (present)	(25.3	(42.2	(25.3
Per cent Rose Bengal B (calc.)	(12.7	(14.6	(36.0
Per cent Rose Bengal B (present)	(13.9	(14.0	(34.9

It appears probable that these results may be accepted as indicative of the general order of reliability of this type of analysis under comparatively favorable circumstances. The primary requisite is that the dyes under examination shall have comparatively well-defined and distinctive absorption spectra. In such instances of dye mixtures the method affords a convenient and rapid means of determining approximate dye contents, which may prove of great utility since chemical methods of analysis will usually prove entirely useless.

[1] Research Associate, Commission on Standardization of Biological Stains.

[2] Senior Chemist, Color and Farm Waste Division, Bureau of Chemistry and Soils.

[3] W. C. Holmes. The Spectrophotometric Evaluation of Dye Mixtures. Amer. Dyestuff Reporter 15: 189, 1926.

[4] The Bunsen extinction coefficient (E) is the logarithm (expressed as a negative number) of the transmittancy, the latter being the ratio of the intensity of the light emerging from the solution to the intensity of the light entering it.

[5] W. C. Holmes and A. R. Peterson, 1930, Absorption Ratios of Biological Stains, Stain Technology 5: 65.

[6] W. C. Holmes, 1923. The Estimation of Erythrosine, Color Trade Journal 13: 45.

Level Fast Colors On Viscose Fabrics

By **FRED. GROVE-PALMER, A.I.C.**

The great demand at the present is for colors that are fast to light and at the same time perfectly level dyeing. Until recently very little attention was paid by shoppers to the fastness of the materials they purchased other than to ask the sales person if the color would run. But now the public demand fast colors, and this is true on viscose fabrics as well. This article deals with the application of level fast colors on the viscose fabric.

THE past year or two has seen the continuation of the significent progress in the production of the higher grades of fast dyestuffs. In the present-day uses of viscose rayon, when the artificial fiber is woven or knitted with silk, cotton, woolen and other yarns, the great demand is for colors that are at the same time fast to light and perfectly level.

This popular demand is most noticeable in regard to curtainings, furnishings and upholstery fabrics generally, but it is also felt in regard in the increasing number of cloths to be used for pajamas and beach suits, which are being adopted more and more by the younger generation of women of all classes. If these goods are to be salable they must stand up to prolonged exposure to brilliant sunlight all the hours it shines in locations free from the pall of smoke that keeps off those ultraviolet rays which are the prominent actors in causing fading.

Until comparatively recently, very little attention was paid by shoppers to the fastness of the colors of the materials they purchased. At one time it was enough to ask the salesperson if the color would run, and if the reply was in the negative, that was good enough; if the cloth faded in the sun or in the washtub and attention was called to it, the owner would say: "I should worry; that girl said the color would not run, and that's all there is to it."

But the public has now been aroused from this apathy; from the drygoods store and through it, the manufacturer has any material fired back if it does not reach such indefinite standards of fastness as the purchaser may think to be her due.

When rayon in the form of viscose first came on to the market it brought in its train a long list of worries which arose partly from differences in the structure of the fiber and its quality caused by the crude methods of manufacture, and partly from the fact that neither knitters nor weavers fully understood the importance of maintaining perfect control of the tension on the yarn while working.

Although some of the troubles of the infancy of viscose still remain, the majority have been swept away by improved processes and a better understanding of the limitations of the fiber, and as a consequence the production of well leveled colors has been made easier. It is, however, a fact that a number of the dyestuffs that give nicely level shades in cotton goods and some varieties of rayon, are far from satisfactory when used on other makes.

It is true that if the viscose is dyed in the hank many of the minor differences of shade are not very noticeable and can be overcome by suitable treatment, but the same cannot be said for broadgoods. Hanks may be sorted into light and dark, and cloths woven from these separately, or they may be used together if correctly proportioned in the warp or filling so as to produce evenness. But if used haphazard, lines and bars will show up. This applies also to materials made from viscose of varied origin and dyed after weaving. Whichever way they occur it means trouble for the dyer who would often seek refuge in the old-fashioned subterfuge of topping off with a color that would be fast enough to hold until the stores had gotten the goods sold; what happened after that was blamed on to the war.

Shortcomings Eliminated

There is the experience of giving a lady of some importance a beautiful viscose sports coat in a delicate shade of saxeblue; her delight was unbounded until after a few days' wearing at a fashionable resort she discovered that she was going around clad like a cerulean zebra, which caused her to look the gift horse very much in the mouth.

Things are very different today; most of those early troubles have been eliminated, and each year sees an enormous increase in the quantity of viscose used with cotton yarns for woven cloths and knitgoods. Indeed, the amount is now so great that viscose has been spoken of as the saving of the fancy cotton trades, and by all accounts it has wanted saving for sometime past. Remembering that such fabrics are composed of two fibers each of which is essentially cellulose, there should be no inherent difficult in getting fast colors or in leveling them, but it must not be forgotten that though essentially the same, they are vitally different in structure: cotton, the natural product being as its name implies cellular which the artificial fiber is not.

Problems of Leveling

Being the outcome of a chemical preparation its reaction towards dyes is very different, and it is obvious that leveling the color on a mixture of the two will not necessarily be an easy matter. Some dyestuffs give with vis-

cose an effect not unlike that of mercerized cotton, as might be expected when it is recalled that the treatment with caustic alkali is common to both processes, and within limits the results obtained are similar.

As regards leveling, the light colors do not present the same snags because the possible variations between pale, rather pale and very pale are not great; but when it comes to medium and heavy tints the difficulties are very much enhanced. For a number of purposes the substantive cotton dyestuffs fill the bill quite well; many of them are of good leveling power but when they are used on materials composed of viscose rayons in which there are inherent differences in the molecular structure of the fiber, this class of dyes does not always show up so well because of the greater affinity they have for the regenerated cellulose than for natural cotton.

It thus is up to the dyer to pick and choose with care, taking only such dyes as have been put on the market with a view to filling the special requirements of these cases. It is not so long ago that there was difficulty in getting blues that would answer the calls of the rayon dyer; this caused the dye makers to devote much attention to the filling of that gap in palette.

There is a class of knitgoods in which the face of the cloth is viscose while the back is cotton; when these are dyed solid the whole effect may be spoilt if the two fibers are of different shades; the evenness of the surface is broken and shows up floury or peppered, according to circumstances. It is quite obvious that the dyer has gotten to give his serious attention to the collection of a set of dyes that will answer his purposes, and it may be needful for him to carry out a number of small works' scale experiments before he can say with safety that he has a full range capable of giving him good results with all the different brands of viscose and all the varied cloths that the weavers may chance to push on to him.

Verification Advised

As the manufacturers of substantive dyes have devoted so much care to the preparation of high quality colors for meeting these problems, it is not necessary to give a list of all that can be used successfully. The information is obtainable from its source, but it is always as well to verify it on small batches in case natural enthusiasm may have led the vendors to claim rather too much for their productions.

It is a fact that some excellent dyes fall down badly when it comes to wanting them to cover up inequalities in viscose fabrics. The latest list of the National Solantine dyes has a number of good colors which have a good all around fastness; their predominating characteristic is fastness to light which is making them extremely popular with dyers in the general drapery, curtain and upholstery trades. Specially noteworthy dyes in this connection are the following:—

Yellows, 4GL, FF conc.
Oranges, 4G conc., G.
Reds, 8BLN, 4BL
Pink, 4BL.
Grey, GL conc.
Violets, R, FFR, FFB.
Blues, R, FF, 2GL, 4GL.
Browns, R, 4R.
Black, L.

Red 8BLN, in the above group, is an ingredient in practically all of the mode shades for hosiery dyeing for the present season.

Research Described

Much research work has been done from time to time with a view to bringing the affinity of the cotton up to that of the viscose in the woven or knitted cloth; it is impossible, of course, to do so absolutely but a somewhat closer approximation may be obtained between the two fibers. When the cotton is mercerized after weaving there is grave risk of the viscose being swollen and weakened, but the dye absorption is improved.

To counteract the damage to the rayon various methods have been patented for introducing a buffer by treating the viscose with gelatine mixed with some metallic salt; aluminum formate is one that has been suggested. A more concentrated alkali can be used for the cotton and the risk of harming the artificial fiber is greatly reduced. The objection to all these processes is, of course, that they introduce another chemical handling which is expensive and takes up time thus decreasing the output from the plant; it is obviously better, therefore, to introduce some modification of the methods of dyeing that will give the desired leveling effect without bringing in any additional troubles and will enable the work to proceed without interruption.

"Tendresse" an Example

When the required shades can be produced by dyeing with an unmixed dyestuff, if the one chosen is of good leveling property, the work does not involve any particular difficulties other than those which are always associated with the dyehouse and which need to be faced in the ordinary routine, but the large majority of mode shades call for mixture of several dyes in varying proportions and if they are not carefully selected two-tone effects may be produced which are far from satisfactory.

As an example of what might happen in this way take "Tendresse," one of the new hosiery shades for 1931 which the Textile Color Card Association has developed from the sponsored colors to harmonize with the basic ensemble shades selected by the National Retail Dry Goods Association's Color Coordination Committee. In a suggested recipe for this color there are no less than six different dyes: Diazine Black S extra, Red 8BLN, Catechine 3G, Acid Milling Red RN, Neutral Brown AN, and Durol Black 2B.

This is intended for hosiery containing silk also, but it can easily be seen that if those dyes had not been chosen with the utmost care and full regard for possible contingencies, the different fibers might well vary in shade when the dyeing was finished. It is evident that if a dyer is in any doubt he will do well to consult with the manufacturers of dyestuffs whom he will find ready and anxious

to give him every possible assistance and advice. Once again, it is needful to add that trials should be made to confirm such instructions, as it may be found desirable to modify them when dyeing on a large scale.

If the dyer has a direct orange, a fast red and a good black, all of good leveling power, he will be able to get out a large number of the pale and light medium shades that are still holding the public favor which will be of good fastness and not likely to vary in depth of color on the different fibers. It is when dyeing up the navy blues, dark browns and the other heavy shades that the color absorptive property of the rayon makes itself felt.

The safest method for the dyer to get around this is to make use of a dye liquor in which the Glauber's salt is cut down to a very small proportion, even going so far as to leave it out altogether, and to work at a rather lower temperature than usual, say around 65 deg. C., less than that if the goods will get to the desired depth of shade. As may be expected, the bath will not be exhausted and no attempt should be made to do so.

It is much preferable to use it as a standbath, and bring it up to normalcy by freshening up with half or two-thirds of the original quantity of dyestuff for the next batch. A little more Glauber's salt may be required but the dyer will have to see how things are going. The use of common salt is often recommended; it is just as good but there is a snag; if the dyehouse also handles goods containing silk, there is danger of contamination with salt which may lead to the production of brown stains and tender places when the goods have been kept in store for some time.

This has, at various times in the past, given rise to great trouble, and for that reason the dyer is strongly advised never to allow sodium chloride to be present where there is the slightest chance for it to come into contact with silk goods.

There is another dyeing process for dealing with the leveling question in connection with viscose mixtures which goes quites in the opposite direction: it requires a very concentrated bath of Glauber's salt or common salt, even as much as 150 lb. to back containing 120 gallons of water. The temperature for entering the goods is only 38 deg. C., but during a run of from one-half to three-quarters of an hour, a little longer in some cases, the temperature is raised to 80 deg.

Although we have not yet adopted this plan for general work, some very successful experimental batches have been put through; it can be used with dyestuffs that would not be suitable otherwise, and leaves the bath more nearly exhausted than the foregoing method, but in a large dyehouse the cost of such quantities of Glauber's might be a deterrent.

Treatment Modified

In order to cope with shade variations that arise from the presence of lines and bars in the fabric caused by carelessness or mistakes in the weaving or knitting departments, the treatment in the dyehouse will have to be modified to some extent. The greater number of ordinary substantive colors will not cover such defects in any way satisfactorily though some of them will do so.

Dyers in all parts of the world have given a warm welcome to a class of dyestuffs that have been put on the market with a view to filling in the empty places on the palette. These are the Icyl colors, a valuable number of which are now available; as they can be used in conjunction with other dyestuffs their range can be considerably extended. The bath for these dyes contains very little Glauber's salt and the entering temperature is just around the boil.

One of the largest uses for viscose is for the hosiery and knitgoods trades where it usually appears in mixtures with mercerized cotton yarns; here it is found that the mercerization process has the effect of causing the cotton to take up more color than the viscose.

Trials and Examinations

This must be qualified by allusion to the extent to which the mercerizing has been carried, but it applies to many cases of normal working. When the required shades are full and medium on the heavy side, the unevenness can be nearly always overcome by making up the bath strong in Glauber's salt; this would not do, of course, for the paler tints. The actual quantity of sulphate required can not be given in general terms but must be found by repeated trials and examinations; so many variables enter into the matter that a definite instruction is not possible: the degree of mercerization is one of them; the chemical and physical condition of the rayon fiber is another, the make-up of the cloth, the sizes of the yarns and the amount of twist on them will have an influence, as will also the closeness or openness of the stitch.

The dyestuffs that produce even colors are not very numerous nor are they of all around suitability; some go better on one make of viscose than another, but by careful selection, the dyer can in a little while gather in a sufficiently wide range to help him over practically every difficult he is likely to run up against.

Mixture of Dyes

One convenience is that though the number of dyes is not large they can be mixed to give every variety of mode shade that is called for. The addition of a small quantity, say 1 per cent or less, of pyridine, tetracarnit, soluble oil, or monopol soap will often help the dyer across the style of unevenness. A number of the Solantine dyes have been named already; the corresponding colors as well as others in the Pontamine list will give similar results, and there are eight or nine in the Chlorazol list that can be recommended.

Since the war, owing to the awakening of the public to the need for really fast colors, it has become habitual with the makers of high-grade fabrics to give a moderately comprehensive guarantee that their materials will not fade either in the sun or in the washtub. It is as well to impress upon the purchasers that a guarantee issued by the makers of the fabric is one thing, and the promise of fastness offered in the same terms by the salesperson in the store without any undue regard for the truth is another,

even though the young lady may have been misled by the somewhat biased views of the traveler who sold the goods. A warranty with the maker's name attached to it means something definite, and the publicity matter should make this quiet clear to the consumer.

Warranting Fast Colors

So far as one is able to judge the practice of warranting fast colors was started by the manufacturers of Sundour cloths, and as the supplies of really reliable fast dyes have been made available has been taken up widely by other makers of good quality materials. Before the initiation of this fast color campaign, even the best of the plain dyed fabrics were not much to write home about; the colors were often very fugitive. The full history of the pioneer work that was done with a view to improving this state of affairs makes very interesting reading as it was told by James Morton in a lecture to the Royal Society of Arts at London, Eng., some two years or so ago.

This is not, perhaps, the place to go into details concerning that work, though it is of vital importance to the textile industry, having been the means of changing entirely the outlook of the consumers and suppliers of the upholstery trade. It is enough to state that within the last two decades there has been an alteration from the fugitive synthetic dyes to similar ones that are of good or excellent fastness to light and washing. The old-timer who used to speak with warm approval of the good old days when natural dye wares could be relied upon but this new fangled chemical stuff could not, had a good deal of justification on his side; so much so that there have been technical training colleges even since the war that have taught their textile students to look to natural dyes when they needed fast colors.

It was obvious that the makers of pre-war dyes had shot their bolt; their production was good up to a point, but the whole world cannot avoid being thankful that other nations had to step into the breach caused by wartime conditions and learn to make dyes for themselves, in which science they soon entirely outpaced the older firms and thus opened up a fresh field of research. One of the results of this has been the preparation of a large number of valuable vat dyes in addition to synthetic indigo (indigotin); with these it is now possible to give almost all shades dyed with remarkable fastness to all adverse influences.

Better Results

It is claimed that until 1911, when piece goods were vat dyed in plain colors, at Carlyle, England, this kind of work had never been done previously, with the sole exception of indigo, which is not quite on a parallel.

Viscose, either alone or in mixtures is colored with vat dyes in a manner similar to that used for cotton but differing in detail. The printers have found that the substitution of potassium carbonate for the more usual caustic soda lye gives them better results, and some dyers have adopted this plan; it has the advantage of preventing damage to the rayon fiber which is apt to swell up and become fragile in the stronger alkali, while incidentally, there is less corrosion of the metal parts of the machinery.

This is even more important in printing than in dyeing owing to the costliness of the engraved metal printing rolls. Another point in favor of the potassium salt is that the penetration of the fiber is greatly improved. The departure from the usual treatment appears to be favorably accepted in some places but is not given as the result of personal experience as opportunity has not yet arisen from making extensive trials. The method by means of which harmful effects of strong alkali upon viscose are minimized in normal works practice, is the introduction of a buffer chemical; such a one is betanaphthol, and a recipe that has been found good is, as follows:—

Caustic soda lye, 75 deg. Tw.	1¼ gallons
Beta-naphthol	4 lb.
Hydrosulphite, Conc. powder	5 lb.
Water, softened	120 gallons

There is the additional advantage in this bath in that it may be used for dyeing both cotton and viscose when knitted or woven up with celanese or any other make of cellulose acetate rayon without endangering the tensile strength of the latter by saponification. When vat colors used are chosen from among those brands which will admit of dyeing in liquors at the ordinary temperature of the room, any risks of damages are still further reduced; furthermore the leveling of the shade becomes easier, and there is little danger of the dyestuff being changed from the soluble condition, although, as will be mentioned later, this is a point that needs watching during the course of work. For making up the vat, the dyepaste, as purchased, should be reduced in the following way:—

Dyepaste	3 lb.
Soft water at 60 degree C.	5½ gal.
Caustic soda lye	1¾ pint
Hydrosulphite	¾ lb.

Setting the Vat

The dyepaste is thinned down by stirring with the water and the other ingredients are added with continued stirring; the vessel is then set aside for a definite period, usually about thirty minutes, for the completion of the reduction; it should be well covered and given an occasional stir around every so often to make sure that it is thoroughly mixed in.

While this is proceeding, the buffer, the beta-naphthol can be dissolved by pasting it up with about 25 per cent of the total quantity of soda lye that is to be used in the bath, and then stirring in some hat water; there is no definite quantity here, somewhere around a couple of gallons is enough.

The setting of the vat is accomplished by filling the jig up to near the mark with cold soft water, and putting into it all that remain of both the soda lye and hydrosulphite; as soon as these have been well stirred in, the beta-naphthol solution is added, properly stirred, to be followed by the reduced dye solution. The whole is agitated and then permitted to stand for a while to allow of the scum to rise; this is collected and removed in a skimmer of muslin

stretched on a small wire frame. The batch of fabric will have been wetted out and is now entered into the vat, taking especial pains in the case of viscose and mercerized cotton mixtures to do this rapidly in order to prevent ending.

The time of working depends, of course, upon the depth of the required color, and may take around three-quarters of an hour; while it is in progress, it is well from time to time, more towards the end of the period, to look at the liquor to make certain that the color is not becoming oxidized. A few drops thrown on a piece of filtering paper will show if there are any specks of coloring matter, in which case a small quantity of dissolved hydrosulphite should be added to take the precipitated dye into solution once more.

The vat dyeing of pale colors can be done in the ordinary jig; when the operation is finished the liquor is drained off in the ordinary way. For mid or heavy colors it will be found necessary to have two jigs working together, to the first of which a pair of squeezing rolls is attached by means of which the liquor is kept back from passing into the second. Any sizing, dress, lubricating material, etc., will have been removed from the fabric before entering; in some cases it is necessary to bleach though this is avoided whenever possible owing to the extra trouble involved and risk of damage to the fibers.

Great care should be exercised over the batching up in order to keep the edges of the material perfectly true; it should also be carefully watched when beaming out of the jig with the same object in view; in this way uneven dyeing of the selvedges may be avoided.

Although the increased demand for absolutely fast colors has led to popularizing of vat-dyeing, and in consequence to a simplification of the methods of operation, there still remains the need for care and attention in working, and if similar results are to be produced every time the same color is required, the dyer should keep notes of all the details of the routine, the time, temperature, and so on, in order that he may reproduce exactly the conditions that held when he was doing the same thing before. If this is not done, it will only be chance that will make two batches of the supposed same shade come out alike if there is an interval between the dyeings.

Only those dyes which are recognized as being fast to chemicking should be oxidized by passing the dyed goods through a bath of 0.5 deg. hypochlorite; some shades will not stand up to the treatment and for these the method used is either oxidizing by aeration or by running through a bath of perborate. When the batch has been squeezed it passes to the cold water rinse in which it receives a few runs, after that it has a hot wash, similarly, until there is only a faint trace of alkalinity. Oxidization is completed by running to and fro in a solution of 1 or 2 per cent of sodium perborate or its equivalent of sodium or hydrogen peroxide; working for rather less than half an hour at a temperature of 65 deg. C. will suffice for this.

Some shades may be altered by the final soaping bath; notice should be taken of this. Apart from this, however, it is advisable to give a few turns in a soap bath containing 1¼ or 2 lbs. of Marseilles soap or some other pure neutral soap in a bath of 120 gallons, the temperature being around 95 deg. C. This treatment will brighten up the color appreciably, though as indicated above there are some of the vat blues that suffer a little change from it.

The foregoing method of applying vat dyes to mixtures of viscose with other fibers refers to one make but slight modification of detail will make it equally applicable to others. The manufacturers' directions should always be studied and can usually be adapted to meet the requirements of any particular mill or make of fabric.

The desired color should be worked from the simplest possible recipe; the putting in of little bits of this, that and the other should be avoided if the result can be obtained by using colors that do not need these additions. As a general rule all the dyes in one range can be used together, but this does not necessarily apply to those of other ranges; a few trials, however, will show if one make can be used with another, which is sometimes a convenience for getting difficult shades. Formerly a yellow-green could only be produced from a mixture of dye-pastes, but now there are several single dyes of wonderful fastness to light and washing that will give this color. In this case it is found to be much faster than any mixture that could be obtained hitherto, and it is far easier to get good leveling and to avoid ending troubles.

Production Improved

Vat dyestuffs have now been raised to such a high pitch of perfection that dyers can issue a catalogue containing forty or more shades and to send out a warranty that in all that number never a one will fade; this is an absolute guarantee of fastness to sunlight in all climates and practically all kinds of washing, with the possible exception of the Mexican laundress. There, of course, it is claimed, that she will destroy the fabric but will send back the color unharmed.

After using, these fabrics can have the hems let down and only a fold will show, not a difference in color froom fading; cloths of all kinds in general use are produced: satin stripes, fancy brocades, repps, poplins, and plains.

Among the Anthrene colors the following will be found useful:

Brilliant Green, 2G, 4G
Olive R
Red G2B
Brown RA
Navy Blue, fine
Black RP
Blues, RCX, 5G
Orange RC, etc.

In the National list the following Carbanthrenes are good:

Yellow G
Blues, GCD, BCS, DR
Violet RR
Black B

The following colors in the extended list of Caledon vat dyes will also be found to answer most purposes:

Yellows, G, 3G, 5R
Gold Orange G
Orange 2RT
Brilliant Orange 4R
Reds, 5G, 2G, BN, 5B, FF
Red Violet 2RN
Brilliant Purples, 2R, 2RB
Purple R
Violet BN
Blues, 3G, GCD, RC, R, 3RK
Jade Green
Jade Green G
Greens, B, G, 2G, RC
Browns, B, G, R
Olive R

The emphasis laid upon vat dyestuffs in these notes must not be taken to indicate that fast dyeings are not obtainable with other dyes when the demands made upon the shades are somewhat less strenuous. The substantive colors of the present day have a fastness to light that was unthought of but a few years back and, as has been indicated already, properly chosen, they will be found to have excellent leveling properties. When cellulose acetate is one of the fibers in the make-up of the cloth, the fact that the luster will suffer some dimming should not be forgotten; on this account overheating should be avoided; it is not advisable to run the heat of the liquor above 85 deg. if it contains no soap, while if soap is present the temperature should be kept down to around 75 deg. C.

Two-Color Effects

In this connection there is noted a somewhat surprising and interesting point: the delustering effect does not appear to result from dyeing in the jig, and on that account the operations may be conducted at near boiling. The reason for this does not appear to be in any way clear, but it is useful to know the fact. The saponifying action of sodium hydrate has been alluded to; dry sodium carbonate, which will answer many of the same purposes, has this effect in a very much lessened degree, and is therefore preferable when it can be used.

In those cases that call for two-color effects, ammonia should be substituted as this will assist in keeping the acetate fiber clear; it has no tendency to cause the regeneration of the acetate to cellulose. When solid shades are wanted, the staining of the acetate is not of much importance and the sodium carbonate can be used.

The majority of viscose cotton mixtures can be dyed with colors of good, if not excellent, fastness, to light and washing, by substantive dyes in baths containing from 1 to 10 per cent of Glauber's salt, the lower quantity for the darker shades; the temperature should be nearly boiling and the time around three-quarters of an hour. When cuprate rayon is used in the fabric, we have found it preferable to cut out the Glauber's, increasing the time by about one-third, at the same temperature. A method of dyeing in which the temperature is altered while operations are in progress is often found useful when circumstances require a change in method; it applies to all mixtures of cotton with any kind of regenerated cellulose rayon. In this case the bath at the time of entering the goods is raised to a temperature of just below boiling, and is assisted with 5 per cent of Glauber's salt; the batch is worked in it for around 20 minutes, keeping the heat up. Then cold water is run through the coils in order to cool the liquor down to 55 deg., and at this stage 25 per cent of Glauber's salt is put in. The working is continued for another thirty minutes, if necessary.

By means of some other of the various methods of dyeing suggested it should be possible to produce level solid shades of good fastness to light on any mixture of rayon with other vegetable fibers.

Indigo and Aniline Dye Market, China

SHANGHAI Customs figures for the first quarter of 1931 indicated a considerable increase in importation of indigo and aniline dyes over imports of the same quarter of 1930. These increased imports were mainly to replace stocks that had been taken up during the latter part of 1930 and are not indicative of larger increases in consumption. It is estimated that the Chinese have abnormally large stocks of dyes on hand, probably an amount sufficient to fulfill requirements for six months, whereas they usually carry only 30 to 60 day requirements. Consumption of dyestuffs is believed to be normal.

Imports of indigo aggregated 22,626 piculs (1 picul = 133-1/3 pounds) during the first quarter of 1930 compared with 59,983 piculs in the first three months of 1931 divided as follows:

	1st Quarter, 1930		1st Quarter, 1931	
		Haikwan		Haikwan
	Piculs	Taels	Piculs	Taels
Paste and liquid, 20%	20,398	778,740	42,181	1,620,590
Paste and liquid, 50%	1,318	122,191	11,253	1,113,022
Grains, 60%	879	116,310	6,221	745,165
Dried, 70%	31	4,894	328	54,225

Imports of aniline dyes in the first quarter of 1931 aggregated 1,723,528 Haikwan taels compared with 575,226 Haikwan taels in the corresponding period of 1930. (Value of Haikwan tael January-March, 1930 = $0.5302 and January-March, 1931 = $0.3507 United States currency.) Detailed data, showing countries of origin are on file in the Chemical Division. (Assistant Trade Commissioner Paul F. Kops, Shanghai.)—*World Trade Note.*

The Causes of "Endedness" in Worsted Piece-Goods*

By C. ROBERTSON

"ENDEDNESS" is a term used by dyers to denote variation in shade of two ends of a piece, and of all faults encountered in the preparing and dyeing of worsted cloths a plague of "endedness" is probably most dreaded by the dyer. Other defects can usually be traced to their source with little difficulty, but "endedness" is in a class by itself, for it can be caused in such a variety of ways; a slight alteration of one process, or the carelessness of an operative, may result in the rejection of hundreds of "ended" pieces. In most cases this fault disappears as mysteriously as it arrived; the cause of the trouble is removed unconsciously, and nobody can tell with certainty how it originated.

During one of these spells of "endedness" the writer devoted a month solely to the study of this phenomenon, and all the facts stated below are borne out by actual experience and by experiment.

Assuming that it is not due to any fault in the quality of the yarn used in manufacturing the piece—which, indeed, is rarely the case—"endedness" is produced chiefly in the crabbing, steaming, and dyeing operations. To find the actual cause, therefore, it is best to study and experiment with each of these processes in turn.

Both careless and insufficient crabbing are likely to cause "endedness." In the first place, it is absolutely essential to maintain the boiling water used in crabbing at the same temperature throughout the process; the steam should never be turned right off, even if the water is boiling, for the entering of the dry goods, besides reducing the level of the water, cools it considerably. If, through carelessness on the part of the operative, the water is not kept at the boil, there is a likelihood of the goods being "ended," since one end of the piece has received a more drastic treatment than the other. This is especially so in Yorkshire crabbing, for the troughs on the machine are comparatively small, and therefore the running in of two pieces into the liquor will reduce the temperature considerably.

"Endedness" in crabbing is frequently caused by insufficiency of liquor in the trough. It is a usual practice in both Yorkshire and French crabs to allow some of the hot water from the second trough to run into the first, to replace that taken up by the entering of the dry goods. A careless operative may forget to raise the water properly to the boil. Again, he may turn his steam on without the addition of further water. In this latter case, when the goods are run over into this second trough, the cloth does not touch the water until perhaps half the piece has been wound on the roll.

Undoubtedly such omissions are due to sheer carelessness on the part of the operative; but, nevertheless, they *do* happen. The writer, noting this laxness on several occasions, decided to conduct a test in which the pieces were run into the second trough with the water purposely at too low a level. The goods were then dyed navy, and on examination it was found that in all cases there was a slight difference in shade between the piece-ends.

After running into the first trough it is not advisable to allow the goods to "swing"—*i.e.*, run round too long in the water before transferring to the second trough. A minute or two is of no importance, but there are cases of operatives who have left the goods "swinging" in this manner for a quarter of an hour, and even longer. Even so it was found that this treatment was not detrimental to the cloth, providing the water was boiling throughout. Indeed, it may be said that if the water is kept definitely at the boil throughout crabbing, and ordinary care exercised in such details as the level of the liquor, there should be no fear of "endedness" occurring in the crabbing process.

The average worsted cloth receives a blowing treatment after crabbing, and, as this is a most drastic process, it is here that "endedness" is most frequently met with. As in crabbing, the fault is caused by insufficent and careless treatment. If "ended" pieces have been steamed one per roll, it will generally be found that the head end, or the end on the outside of the roll, will be lighter in shade than the tail end. This is due to either insufficient steaming or too rapid an increase of steam pressure at the beginning of the steaming operation. Again, if two pieces are steamed on the same roll—a practice regularly adhered to in the case of easily penetrated goods such as loose-weave serges, poplins, or charmelaines—it is found that the second piece on the roll is most likely to be defective.

In an experiment, 12 pieces, incorporating three qualities of cross-bred serges, were first crabbed carefully and

*The Textile Manufacturer.

then steamed in twos, which was the normal works process for this quality. They were given the steaming treatment accorded to this class of goods, which, briefly, meant actual treatment with steam at an increasing pressure of from 6 lbs. per sq. in. up to 45 lbs. per sq. in. for a period of 3 mins. The goods were then scoured and dyed with Chrome Blue S T and Acid Cyanine B F. The results were as follows:—

Quality A, Piece No. 1. Satisfactory.
Quality A, Piece No. 2. Head end light.
Quality A, Piece No. 3. Satisfactory.
Quality A, Piece No. 4. Head end light—badly ended.
Quality B, Piece No. 1. Satisfactory.
Quality B, Piece No. 2. Head end light, hardly noticeable.
Quality B, Piece No. 3. Satisfactory.
Quality B, Piece No. 4. Head end light, hardly noticeable.
Quality C, Piece No. 1. Satisfactory.
Quality C, Piece No. 2. Ended, head end light.
Quality C, Piece No. 3. Satisfactory.
Quality C, Piece No. 4. Satisfactory.

In the above experiment the "endedness" was undoubtedly due to the steaming operation, for pieces number two and four in all cases were the second pieces on the roll, while the goods had been French-crabbed four per roll, and dyed in two batches of six pieces each.

A definite gradation of shade may often be noticed in "endedness" caused through defective or insufficient steaming. The head end of the piece will be light, the middle darker, and the tail end a darker shade still; whereas in "endedness" caused by dyeing alone, it is merely the end of the piece which is darker or lighter, the rest of the cloth being the same shade throughout.

After the scouring process the goods should not be allowed to stand for any considerable length of time before dyeing, for one of the ends is always exposed, and therefore liable to dry. Residual grease and soap cannot entirely be removed from the material, and even in a well-scoured cloth the latter is usually present to the extent of 0.2-0.3%. If the end of the piece is allowed to dry, the soap, along with any residual alkali, tends by capillary attraction to migrate to the end of the piece, which consequently will dye a shade different from that of the rest of the cloth.

This may not seem of importance in most modern dyehouses where the goods are dyed immediately after scouring or seldom allowed to stand for more than a few hours. Nevertheless, even in the most efficient works pieces are overlooked, or are held back for some reason, such as a question of shade. Cases occur of pieces which are left in the wet state for three or four days, or even longer.

The practice of laying pieces out on a "horse" is also a fruitful source of "endedness," for if the goods are not dyed immediately, the whole width of the piece is exposed to the drying effect of the surrounding air. To obviate "endedness" in such cases, many dyers boil the goods in a weak solution of ammonia before dyeing. This, of course, removes any residual soap, but if the chemical composition of the cloth has been altered by concentration of excessive alkali, it would appear to serve little purpose.

In the dyeing itself, "endedness" may be caused by faulty sewing-up of the pieces into rope form. If the ends are not sewn together evenly a crease may run up the piece for several feet, with a result that uneven dyeing is often produced. This, however, can be easily detected, even if the sewing is removed, for, naturally, the shade differs only at the place where the crease has been.

A far commoner source of trouble is caused by the use of inferior dye. Thus, it was found that pieces which were prepared by identical methods and dyed with two different navy mixings gave different results. The goods dyed with the inferior and cheaper navy were "ended," while those dyed with the better levelling dye were satisfactory. Here it is impossible to state definitely whether the dyeing was at fault or the preparing. On the surface it would appear to be the dyeing, but then the dyer argued that the fault was there before he received the pieces from the preparing, and that by using a good levelling dye he had simply eradicated the fault, a result which the poorer dye was not able to accomplish.

In curing "endedness" it is necessary to take into account the probable cause of the defect. Thus, if it is considered to be a dyeing fault, merely scouring and redyeing will effect a cure. The material should be given a light, warm scour with the addition of a little ammonia to remove as much color as possible, and then redyed to shade. Often the pieces are not even scoured; they are simply stripped in the dyehouse and redyed.

In the case of crabbing and steaming "endedness," however, scouring and redyeing are not sufficient, for since the chemical composition of the cloth has been altered, the defect would simply reappear after dyeing. Therefore, after scouring it is necessary to resteam the goods. One piece only is steamed at a time, and the light end is run on to the steaming-can first, and the ordinary setting treatment given. It is advisable to carry out this operation at the end of the day's work, for a great deal of color is forced out of the cloth, and as this stains the steaming wrappers it is necessary to rewrap the cans before proceeding with the ordinary grey goods.

After scouring and steaming the pieces are redyed to shade, a treatment which will generally be found to cure even the worst cases of "endedness."

General Releases

Among the recent releases of the General Dyestuff Corporation are Chromoxane Cyanine R, recommended by the company for printing cotton with chrome acetate; Fast Corinth L B Base a new developing agent which in combination with most of the naphthols is said to produce bright reddish to bluish corinth shades of very good all around fastness properties; Naphthol AS-LB which, the company claims, produces a line of shades which range from khaki to reddish brown when used in combination with developing agents. They have also brought out a new sample card showing the full line of available Indanthrene colors, dyed on cotton yarn in 3 different percentages.

Proceedings of the American Association of Textile Chemists and Colorists

The American Association of Textile Chemists and Colorists

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R. A. Gilliam, Chairman; D. B. Hardin, Secretary.

CALENDAR OF COMING EVENTS

Annual Meeting
December 4, 5—Boston.

* * *

OUTING OF PIEDMONT SECTION

THE Piedmont Section of the American Association of Textile Chemists and Colorists held a most enjoyable outing at the Myers Park Club, Charlotte, N. C., July 11th, 1931.

The afternoon program consisted of golf, baseball, quoits, swimming, bridge, etc.

A rather unusual program was arranged for the evening, starting with the banquet, followed by the principal address by Julian Miller, editor of the "Charlotte News," Charlotte, N. C. Mr. Miller's talk was well suited to the spirit of the occasion and was enjoyed by all. The Buccaneer Quartet entertained with their usual fine harmony.

We were fortunate in having a large number of our wives and lady friends present at the dinner. One of the special features of the evening was the cotton dress parade for the ladies. A very handsome price was awarded for the two ladies having the most attractive cotton dress. The prizes were awarded to Mrs. W. H. Willard and Mrs. Chas. H. Stone.

Chairman Samuel L. Hayes and Vice-Chairman John L. Crist presented the prizes for the various athletic events of the afternoon.

A most enjoyable dance was held after the evening program.

The next meeting of the Piedmont Section will be held about the 17th of October, at which time the Piedmont Section will elect their officers for next year.

Best wishes and the flowers used at the banquet were sent to our congenial friend and member, Joe Moore, who is recovering from a very serious automobile accident. Joe's pleasing personality was greatly missed at the outing, and all expressed the hope that he would soon be back with us again.

Chairman Hayes appointed the following Nominating Committee to bring in names of officers for the coming year, to be elected at the Annual Meeting held in the Fall:

Chairman—D. C. Newman, Charlotte, N. C.
Hobart Souther, Greensboro, N. C.
Dyer Moss, Greenville, S. C.

Respectfully submitted,
A. R. Thompson, Jr.,
Secretary.

SIXTY-SEVENTH MEETING OF RESEARCH COMMITTEE, AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS—MAY 15, 1931

THE Sixty-Seventh Meeting of the Research Committee of the American Association of Textile Chemists and Colorists was held at the Engineers' Club, Boston, Mass., Friday, May 15, 1931 at 3:15 P.M.

The following were present:

Prof. L. A. Olney, Chairman

Wm. H. Cady	Harold W. Leitch
Hugh Christison	Wm. R. Moorhouse
H. R. Davies	Geo. A. Moran
Dr. Carl Z. Draves	Dr. D. H. Powers
Walter C. Durfee	Dr. Walter M. Scott
Henry D. Grimes	P. J. Wood
Walter M. Hadley	Research Associates:
Dr. Jos. F. X. Harold	Dr. Milton Harris
B. L. Hathorne	Bertyl A. Rybergh
Arthur E. Hirst	Wm. C. Smith

Alex. Morrison, Secretary

Prof. Olney, as Chairman of the Sub-Committee in Charge of Research Program, reported on a meeting of this Committee. Dr. Milton Harris, one of our Research Associates at the Bureau of Standards, is working on a method for the Determination of the Iso-Electric Point of Wool which will be applicable in the average mill laboratory and finally will study the relationship of the iso-electric point to the processing of wool fibers and fabrics in the industry. Dr. Harris is also studying the chemical action taking place when silk deteriorates upon exposure to light.

The Committee has approved a problem on Cotton, i. e., Study of Deterioration of Unbleached Kier Boiled Cotton and Bleached Cotton on Exposure to Light. They are also considering a study of the Chemical Activity of Cotton during various stages of processing, and Viscose in respect to dyestuffs. A study of the carbonization of Wool is also to be undertaken.

Dr. Harris reported in detail in regard to his work to date, outlining many interesting facts discovered during the progress of his work, and it is expected that several papers will be published before the end of the year.

Wm. H. Cady as Chairman of the Sub-Committee on Light Fastness reported that the Committee's latest report was about to appear in the proceedings. He reported that work was under way in comparing the Fugivometer with the Fadeometer, and that also the study of the Krais Test Paper was in progress.

Wm. C. Smith, our old Research Associate at the Bureau of Standards, reported on the progress of his work on comparison of Korex vs. ordinary glass globes on the Fadeometer, and other work for the Light Fastness Committee. Results will be published later in the Proceedings.

Hugh Christison, as chairman of the Sub-Committee on Fulling Fastness together with Bertyl A. Rybergh, our Research Associate working at the Lowell Textile Institute, reported on the procedure for making fulling tests as adopted to date and displayed a few samples of results obtained. Work on this line is continuing.

Dr. Jos. F. X. Harold, as Chairman of the Sub-Committee on Methods of Testing Waterproofed Textiles, together with Mr. Smith, reported on their work including work on tests for determining the Durability and Wearability Fabrics, taking into consideration different aging and crumpling tests.

B. L. Hathorne, as Chairman of the Sub-Committee on Rayon, announced that their report on the Identification of the various types of Rayon was nearly ready for publication.

The meeting adjourned at 5:30 P.M.

Respectfully submitted,

ALEX. MORRISON,
Secretary.

APPLICANTS FOR MEMBERSHIP

Active

Ralph N. Lulek, Research Chemist, E. I. duPont de Nemours & Co., Jackson Laboratory, Wilmington, Del. Sponsors: C. A. Seibert and Carl Z. Draves.

A. J. Wuertz, Chemist, E. I. duPont de Nemours & Co., Jackson Laboratory, Wilmington, Del. Sponsors: C. A. Seibert and Carl Z. Draves.

Ray A. Spooner, Buyer, Carolina Dyeing and Winding Co., Mt. Holly, N. C. Sponsors: Henry B. Constable and D. C. Newman.

Peter Graham, Carolina Dyeing & Winding Co., Mt. Holly, N. C. Sponsors: Henry B. Constable and D. C. Newman.

P. C. Zell, Technical Demonstrator, Nyanza Color & Chemical Co., Charlotte, N. C. Sponsors: A. R. Thompson, Jr., and George P. Feindel.

Junior

James N. Grant, Laboratory Assistant, Calco Chemical Co., Charlotte, N. C. Sponsors: Chas. H. Stone and Hugh Puckett.

Proceedings of the American Association of Textile Chemists and Colorists

Sodium Peroxide*

By **J. C. ROBERTSON**

Roessler and Hasslacher Chem. Co.

THERE is an advantage in having twins in a family—if you don't like one, you can try the other.

The Roessler & Hasslacher Chemical Company is in the selling end of the bleaching game with a set of chemical twins. For the trade we call one Albone "C" and the other Solozone. We're sending them both out into the bleaching business; we're letting them both work in the same type of kier—our own R&H bleaching kier. And, if you don't like the one, then get acquainted with the other.

Twin No. 1 or Albone "C," is known at home as hydrogen peroxide. For general work, and for work where the bleaching bath must be restrengthened by adding more chemical, use this twin and always count on good results. Albone "C" comes into your mill as a liquid in glass carboys, and is the easiest bleaching chemical to use, since it is only diluted and added directly to the kier.

Twin No. 2 or Solozone, is known at home as sodium peroxide. This twin is used for many grades of cotton or linen goods. If you have a batch process, get to know Solozone. Solozone comes to your mill in sealed cans or steel drums as a dry powder. With this twin a quantity of the bleach must be mixed with dilute sulphuric acid and added to the kier, along with the goods to be bleached. Some sodium sulphate, or Glauber's Salt is formed in the process; for most jobs this is harmless in the kier and in some cases may help the bleaching. And best of all, it comes into your mill at a lower price per pound of goods bleached, than does his brother Albone "C."

The Roessler & Hasslacher Chemical Company has trained both of these bleaching twins for use in the R&H kier, because it believes this is the cheapest, simplest, and most fool-proof bleaching tool. The load of goods is allowed to remain in a hot solution of either Albone "C," or Solozone, until the white you want is obtained. It is then rinsed with water. Nothing could be simpler. There is no rehandling to ruin the cloth or run up labor charges. A lasting white is obtained without any fabric failure. Natural luster, strength, and elasticity remain in the cloth.

One more point for our twins. They come from a good family. They are thoroughbreds that can be depended on in a pinch. To always obtain the white you want, bleaching chemicals of unchanging specification must be used. The Roessler & Hasslacher Chemical family has maintained its specification standards for many years. When you use Roessler & Hasslacher products in your kier, there can be no question as to their quality.

The Roessler & Hasslacher twins, Solozone and Albone "C," and their bleaching kier ask for your further investigation. You are interested in lower operating costs, better quality, simplicity and dependability. You are interested in bleaching in the most modern way. Get in touch with the Roessler & Hasslacher Bleaching Station. Have bleaching experts demonstrate our twins.

We believe there's one advantage in selling twins—if you don't like one, you'll try the other.

*Presented before the organization meeting of the Southeastern Section.

SILK STANDARDS FOR FASTNESS TO WASHING

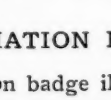
"A series of four colored silk swatches, 4 x 8" in size representing four definite degrees of fastness to washing have been prepared by the sub-committee on silk of the Research Committee of the American Association of Textile Chemists and Colorists. It is possible to classify the fastness to washing of any silk fabric by comparison with these standards in the standard washing tests for silk. With each set of standards there are furnished a list of the standard washing tests and a description of the method of classification based on these tests.

Price per set—$1.00

Send your orders to Alex Morrison, secretary of the American Association of Textile Chemists and Colorists at Andover, Mass.

ASSOCIATION BADGES

The lapel button badge illustrated herewith is worn by members of the American Association of Textile Chemists and Colorists.



The three "rings" are enameled in red, yellow and blue, respectively, and the initials and border are brought out in gold. The general effect is exceedingly attractive.

Badges may be secured at $1.50 each by addressing the Secretary.

ALEX. MORRISON,
American Woolen Co.,
Andover, Mass.

AMERICAN DYESTUFF REPORTER

Devoted to the use and application of dyestuffs and the mechanical equipment incidental thereto.

LOUIS A. OLNEY
Professor of Chemistry and Dyeing, Lowell Textile Institute
Directing Editor

NORMAN ALBIN JOHNSON
Managing Editor

MYRON DREW REESER
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QUALITY PRODUCTS

ALTHOUGH at the present time there is little money in circulation there is a demand for quality goods rather than for cheap imitations. One of the reasons is that the people demand their money's worth. They haven't much of it and they make sure of the value they get for every dollar. If the prices have dropped on cheap merchandise they have also dropped on the high class goods. When a person buys a cheap product, if he is lucky he gets his money's worth and no more. If he buys a quality product, he gets his money's worth and also the satisfaction of knowing that he has the best. The result is a greater demand for a good grade merchandise and a decreasing demand for low-priced inferior imitations.

Buyers are more and more insisting that they get first class material. If they can't get it in one place they will surely get it in another. If you want to keep them on your customer's list you have to "deliver the goods"—and delivering the goods implies that they be of premier quality and in first class condition.

Just now the buyers are in a position to demand what they want. Economic conditions have brought about what is known as a buyer's market. This puts the seller in a position where he has to satisfy the purchaser in every respect if he wishes to hold the trade. Consequently people will become accustomed to getting the best and they will accept nothing else. When the market changes and there is an increased demand for all types of merchandise it is more difficult to always get the best. But if buyers are accustomed to getting quality they will be apt to refuse cheap substitutes even though they are unable to get what they really want.

WHAT HAVE WE LEARNED?

ACCORDING to the opinion of several experts we are now on the road to recovery after a pronounced economic slump and 1932 should show some definite improvement. How much have we learned from this business depression? Such a state of affairs as we have experienced for the last year or two is generally seen on only one side—that of a despairing situation. But much can be gained during such a period if business men are smart enough to grasp it. In a business depression there is a lessening of the process of exchange whereby the products of industry pass into the hands of the consumer. Such a condition of affairs will leave the executive much time to ponder his difficulties. If he is content to sit back and let things come as they may he will probably be caught again in a future depression. However if he will use this time to thoroughly analyze the condition of production and marketing he can plan his future policies in such a way that he will be prepared to meet future calamities. Whether unemployment results from depression, or depression results from unemployment is a problem each executive should face and settle.

Perhaps it would be better to state what we should have learned rather than what we have learned.

We should have learned to level our production curve to meet future possibilities rather than the mere present. Eventually this will lead to a production that will remain stable at all times. Overstocking in a period of prosperity will leave such a producer with goods on hand that he will have to dispose of at a loss, if he can get rid of them at all.

We should have learned that without labor people will have no money, and without money they cannot buy. If they do not buy, producers cannot sell, and production is curtailed or stopped entirely. The result is further unemployment and decreased production.

We should have learned that the purchasing power of the dollar is only a comparative quality. When high wages and salaries prevail, there are high prices and vice versa. What advantage has one condition over the other? If you can buy twice as much for a dollar when your salary is cut in half the value received still compares favorably with the value given in labor. Money is useful insofar as it enables us to purchase the things we want. Whether we receive commodities or money for our labors we get the same satisfaction from them. Money only adds to the convenience in obtaining them.

We should have learned that instead of planning only for the present or for a year ahead we should plan ten, twenty, or twenty-five years ahead. Many economists consider business to move in cycles with depressions and peaks reoccurring at specific intervals. If this is so we should plan further ahead than just during one particular high or low point. In so doing we would contribute toward the leveling of the curve of production and employment.

So much for what we should have learned. Everything stated above is probably perfectly obvious to the average person. But how many men will apply sound business principles when the country is again in a flourishing and prosperous condition? Or will they dump load after load on the market in the belief that such a condition will last forever? As soon as manufacturers learn to keep down their production to that level which they will be in a position to maintain for several years and foresee a decreased demand then the spectre of overproduction will disappear from the economic landscape.

The present depression has again illustrated the principle of "survival of the fittest" which applies to industries as well as to mankind. Business ventures which should never have been started and which could only exist in times of abnormal buying power have been wiped out. Plants in which no thought of scientific management and control have occurred have been forced to close. Whatever industries have survived our most recent slump are the ones that will continue to function through the years.

Steady Increase in Use of Vat Dyes

The consumption of vat dyes has shown a remarkable increase during the past several years. According to a report issued by the United States Tariff Commission, consumption of vat dyes during 1914 amounted to 1,945,304 pounds. During 1923, 2,815,771 pounds were used and in 1929 the consumption rose to 10,813,948 pounds.

Apparent consumption of vat dyes, other than indigo, during 1914 and 1923 to 1929 is shown below:

Year	Pounds	Year	Pounds
1914	1,945,304	1926	4,660,449
1923	2,815,771	1927	6,650,422
1924	3,051,931	1928	8,055,680
1925	4,671,645	1929	10,813,948

Dillons Klipstein Limited

It has been announced that the activities of Dillons Limited and A. Klipstein & Company Limited of Canada have been consolidated and in the future will be conducted under the name of Dillons Klipstein Limited with offices at 205 St. Paul Street, West; Montreal and 95 King Street, East Toronto, Canada. Dillons Klipstein Limited have been appointed Selling Agents for Canada for the following companies: American Cyanamid Company, The Kalbfleisch Corporation, A. Klipstein & Co., Inc., in addition to which the new company will continue to handle the same products formerly sold by Dillons Limited and A. Klipstein & Co. Limited.

Du Pont Release

Pontamine Fast Black GCW, a direct dyestuff which gives full shades of black on cotton or rayon and leaves acetate rayon practically unstained, has recently been announced by the Dyestuffs Department of E. I. du Pont de Nemours & Company. The product is jet in shade and is claimed to show less tendency to bronze than products previously offered for this type of work.

The fastness to washing and perspiration is said to be sufficiently good to allow of the use of Pontamine Fast Black GCW on all kinds of hosiery, as well as for dress goods where it is desirable to leave the effect threads unstained.

Color Correlation Chart

The Color Correlation Chart for fall and winter 1931 has just been released to members, it was announced today by the Textile Color Card Association.

The outstanding colors for daytime and evening costumes are listed in the Chart according to their cast and for each group are indicated for fashionable coordinating shades for accessories, including shoes, bags, gloves and hosiery.

As a further guide to fall color coordination, the chart lists the basic coat and dress colors adopted by the Color Coordination Committee of the National Retail Dry Goods Association, as well as the shades selected for fall promotion by various manufacturing industries, including the Associated Dress Industries of America and the Allied Millinery Associations.

The continued style importance of color contrast in the fall mode, with special emphasis upon the French Colonial Colors as accent notes, gives significance to that portion of the chart in which the smartest bi-color and tri-color themes are indicated. Favored color harmonies are suggested as well.

The chart is to be used in conjunction with the various 1931 fall season cards for silks, woolens, shoe and leather and hosiery issued by the Textile Color Card Association.

Intended primarily as a guide to retailers in effecting the correct color coordination in the apparel and accessory departments of the store, the chart will also prove useful to manufacturers in indicating the preferred shades for the various accessories which make up the ensemble.

New General Dyes

General Dyestuff Corporation has issued circulars illustrating a very interesting new group of dyestuffs for printing cotton and rayon, called Rapidogen Colors, which so far includes nine different types.

They are different, it is said, from the well known Rapid Fast Colors insofar as they form perfectly stable powders which can easily be made into printing pastes of unlimited stability and therefore can be kept in the color shops for any length of time, like Vat color pastes.

It is further claimed that the Rapidogen dyestuffs can be fixed without steaming; merely by an after-treatment with hot formic-acetic acid.

The group includes a Yellow, Orange, Scarlet, 2 Reds, a Bordeaux, 2 Blues, a Violet, Corinth and Brown. All the shades, so the release states, show a very good fastness to washing and chlorine and also a Good to Very Good fastness to light.

Damages, Stains and Discolorations*

How to Trace Their Origin on White Cotton Goods

By S. R. TROTMAN, M.A., F.I.C.

COTTON goods do not give rise to nearly so many complaints as wool, silk and artificial silk materials. Nevertheless, damages, stains and discolorations are the cause of occasional trouble and claims from customers. Some of these defects are easy to diagnose, but in many cases it is extremely difficult to form any definite conclusion as to the cause of the fault.

In general, damages, stains and discolorations are due to:—

(1) Mechanical causes.
(2) Unremoved natural or adventitious impurities.
(3) Calcium and magnesium soaps.
(4) Formation of oxycellulose.
(5) Acid.
(6) Metallic matter.
(7) The growth of bacteria or mould.
(8) The decomposition of chemicals used in dressing.

Unclassifiable Causes of Damage

Although this list is rather formidable, it is by no means complete, and many causes of damage or discoloration are incapable of being classified. The different types of damage enumerated above will now be dealt with briefly.

(1) Mechanical damage can be produced at any stage of the bleaching process. Uneven bowls of a mangle or defects in the fallers of a beetling machine, if undetected, may cause much trouble.

Certain kinds of damage produced in kier-boiling are often indistinguishable from mechanical damage. Thus, if the lime used in the lime-boil contains magnesia it slakes very slowly and unslaked particles may become attached to the goods. These particles take up water in the kier and in so doing may develop sufficient heat to burn a hole in the goods.

Faulty Management of Kier

Another similar defect may be caused in the soda boil. It happens, sometimes, that a strong solution of caustic soda is put into the sump of a kier and, after the introduction of the goods, the apparatus is filled up with water or a dilute solution of caustic soda. This floats upon the surface of the concentrated liquor beneath and, when circulation is started, comes into contact with the goods, causing shrinkage to take place. In the case of lace, this results in distortion of the pattern or rupture of the finer threads. Removing the lid of the kier before washing away the lye produces a similar effect, owing to evaporation at the surface exposed to the air.

The identification of mechanical damage depends largely upon microscopic examination of the material, together with the elimination of chemical agencies. In the case of local shrinkage, due to concentrated solutions of caustic soda, there may be evidence of mercerization, such as an increased affinity for Congo Red or zinc-chlor-iodide. Unmercerized cotton is only slightly stained when treated with the latter reagent while mercerized cotton is colored blue, the depth of color increasing with the degree of mercerization. Zinc-chlor-iodide consists of a solution of iodine in potassium iodide, mixed with a concentrated aqueous solution of zinc chloride.

Incomplete Lye-Boil

Unremoved impurities.—One of the common troubles with white goods is that they lose color gradually or become discolored when kept for some time, developing a yellow or yellowish-brown tint. In many cases this defect can be traced to an incomplete lye-boil and consequent failure to remove completely the natural impurities of the cotton, namely, pectins, proteins and waxes. Which of these impurities is responsible for yellowing has been the subject of considerable discussion.

Proteins.—Hebden (*J.S.C.I.*, 1914, p. 949) maintained that proteins are the principal cause of yellowing, while Cross and Bevan associated this fault with the gradual decomposition of chloramines, formed by the action of chlorine on proteins which had not been hydrolized by the lye-boil. Levine (*J.S.C.I.*, 1916, p. 687) held the same opinion. Higgins, on the other hand, found that the removal of proteins from cotton does not present much difficulty owing to the readiness with which they undergo alkaline hydrolysis. As a matter of fact, bleached cotton rarely contains more than traces of nitrogen. If yellowing were due to chloramines it would be accompanied by tendering, owing to the fact that chloramines undergo gradual decomposition with the liberation of hydrochloric acid. But yellowed cotton is not usually tender.

Chloramines may be detected in bleached cotton by means of the reaction described by Cross and Bevan. Both chloramines and hypochlorites liberate iodine from potassium iodide, in presence of dilute acid. Hypochlorites

*Dyer and Calico Printer.

are decomposed by hydrogen peroxide, but chloramines are not. When bleached cotton liberates iodine from an acidified solution of potassium iodide both hypochlorites and chloramines may be present. A fresh piece of the sample is then soaked for a short time in an acidified solution of hydrogen peroxide. The hypochlorite, if present, is decomposed in accordance with the equation:—

$$2HOCl + H_2O_2 = 2HCl + 2H_2O + O_2.$$

The cotton is now washed with water until the excess of hydrogen peroxide is removed and again treated with acidified potassium iodide solution. If iodine be liberated, the presence of chloramines is indicated. There is some difficulty in removing the last traces of hydrogen peroxide and if it is not removed completely it will also liberate iodine from potassium iodide. The test is improved by treating the washed cotton with a little potassium permanganate solution to ensure freedom from hydrogen peroxide and then with oxalic acid to decompose any residual permanganate. It is then washed well with water and the test completed.

Pectins are hydrolized readily by alkalis, including weak alkalis, such as sodium carbonate, with the formation of soluble pectates and are not responsible for loss of color or yellowing.

Cotton Waxes Usually to Blame

In most cases, loss of color or yellowing in bleached cotton can be traced to unremoved cotton waxes, which have worked their way gradually to the surface of the goods. The cotton waxes, according to Clifford and Probert (*J. Text. Inst.*, 1924, T401) are highly colored bodies, with melting points of from 76.5 to 80.5 deg. C. They contain gossypyl alcohol, $C_{30}H_{62}O$; montanyl alcohol, $C_{28}H_{58}O$; and carnaubyl alcohol, $C_{24}H_{50}O$, in combination with palmitic, stearic and carnaubic acids. Some triglycerides of these fatty acids are present also. All waxes are difficult to saponify with aqueous solutions of caustic alkalis, even when the saponification is conducted under pressure. In the laboratory, complete saponification is ensured only by heating the waxes with a mixture of glycerol and caustic potash. It is doubtful if they are ever saponified completely in the lye-boiling process, their removal depending upon emulsification by means of the soap formed from the triglycerides which are present. They are not decolorized by bleaching.

Danger of Light Lye-Boil

Although they are not apparent when the goods are newly bleached, the waxes work their way to the surface gradually and loss of color or actual discoloration ensues. There is a temptation to lighten the lye-boil in order to minimize loss of weight. This is, however, a dangerous practice. It is an indisputable fact that unless cotton is completely bottomed in the lye-boil, it is impossible to obtain a pure or durable white in bleaching. Loss of color, due to waxes, can only be rectified by repeating all the bleaching operations from the beginning. The difficulty in removing waxes constitutes the reason why processes are repeated either wholly or in part when the highest degree of white is required.

The completeness of the lye-boil may be tested in the following manner. About 2 grm. of the sample are dried at 105 deg. C. weighed in a stoppered weighing bottle and boiled in a large flask, attached to a reflux condenser, for 4 hours, with 500 c.c. of a 1 per cent solution of sodium hydroxide. The boiled cotton is then filtered through a weighed Gooch crucible and washed with hot distilled water until nearly free from alkali. The residue is then washed with dilute acetic acid to remove the last traces of alkali, and finally with water, until free from acid. It is then dried at 105 deg. C. and weighed in the weighing bottle, and the percentage loss in weight calculated. A well-boiled cotton will lose hardly any weight when treated in this way while if badly boiled the loss may amount to as much as 5 per cent.

Detecting Liability to Yellow

Liability to turn yellow may be detected also by heating a piece of the cotton for an hour in an autoclave at a pressure of one atmosphere. In Freiberger's modification of this test the cotton is moistened with a solution of sodium recinoleate and steamed at atmospheric pressure. Another test is that of Priest (*J.S.C.I.*, 1913, p. 17) in which a weighed portion of the sample is soaked for six hours in a cold 5 per cent aqueous solution of sodium hydroxide, and then washed as described above, dried and weighed. When treated in this way well-bleached cotton does not lose more than about 0.5 per cent by weight.

Adventitious mineral oil naturally produces discoloration. This is, however, generally localized whereas that due to waxes is diffuse. Mineral oil stains can be detected by extracting some of the cotton in a Soxhlet extractor with petroleum ether, evaporating off the solvent, saponifying the residue, extracting, and weighing the unsaponifiable matter. The removal of these discolorations can be effected by means of a solution of soap or sulphonated soap in a suitable organic solvent.

Discolorations caused by soaps of calcium and magnesium are due to the use of hard or imperfectly softened water in the soda boil or in soaping. Like discolorations due to waxes, they are not apparent at once, but are developed gradually, on storing the goods. This is because the compounds of calcium and magnesium with fatty acids are colorless bodies as a rule, but are decomposed by atmospheric carbon dioxide with the liberation of the fatty acid. This fatty acid is generally colored and, if unsaturated, undergoes oxidation, giving hydroxy fatty acids which are always dark in color. These changes are illustrated by the equation:—

$$(C_{17}H_{33}COO)_2Ca + CO_2 + H_2O = 2C_{17}H_{33}COOH + CaCO_3.$$

$$C_{17}H_{33}COOH + H_2O + O = C_{17}H_{33}(OH)_2COOH.$$

Discolorations due to these soaps may be identified as follows: The cotton is first extracted in a Soxhlet extractor with petroleum ether or benzol, to remove any wax which may be present. It is then soaked in dilute hydrochloric acid to decomposed the calcium and magnesium soaps, with the liberation of the fatty acids. These remain

on the cotton. After washing with cold distilled water to remove the excess of acid and the chlorides of calcium and magnesium, the cotton is dried and extracted again with petroleum ether. After the solvent has been evaporated any residue left will consist of fatty acids, present as soaps.

Oxycellulose Discolorations

The practical removal of calcium and magnesium soaps is carried out on the same lines as the test. The goods are treated with cold dilute hydrochloric acid to decompose the soaps, then washed with soft water and finally boiled with a solution of sodium carbonate or caustic soda to saponify the free fatty acids.

Discolorations due to oxycellulose.—Oxycellulose becomes yellow slowly at ordinary atmospheric temperatures and more quickly at elevated temperatures. When much oxycellulose is present the goods will be tender, but quantities which are insufficient to cause loss of tensile strength may, nevertheless, produce loss of color. Oxycellulose may be produced either in the lye-boil or in bleaching. When cotton containing either lime or caustic soda is exposed to air oxycellulose is formed. Closing the kier before all the air has been expelled or opening it before washing away the alkaline lye are occasional causes of oxidation.

Oxycellulose formed during bleaching may be due to the use of old liquors which have become acid, the presence of catalysts such as iron or copper in the goods or the employment of bleaching liquors of too high a concentration. The type of oxycellulose produced depends upon the conditions of previous processes. According to Birtwell, Clibbens and Ridge (*J. Text. Inst.*, 1925, T13), in the type obtained on the alkaline side of pH 7, acid groups predominate over carbonyl groups. The product is characterized by solubility in sodium hydroxide solution, a high affinity for methylene blue and a comparatively low reducing power, as indicated by the copper number.

Effect of pH Value

When formed on the acid side of pH 7, the opposite is the case. The oxycellulose contains comparatively few acid groups and more carbonyl groups. Hence it is characterized by low solubility in sodium hydroxide solution, a small affinity for methylene blue and a high reducing power towards Fehling solution. By determining the copper number and the methylene blue number of the sample the method of formation of the oxycellulose may be deduced.

There is no way of remedying goods containing oxycellulose. The best way to detect oxycellulose is to determine the copper number of the cotton. If this be greater than 0.5 the cotton may be regarded as overbleached.

Acid damage.—So little as 0.005 per cent of a mineral acid will convert cellulose gradually into hydrocellulose. Incomplete washing after souring may thus cause tenderness in the case of goods which have not been soaped. Dressed goods may become tender owing to the presence of mineral acid in the assistants used or formed by the hydrolysis of magnesium chloride or zinc chloride. Methyl Red is capable of detecting the presence of 0.005 per cent, of sulphuric acid, and if the sample has an acid reaction to this indicator it is likely to develop tenderness.

Metallic stains and discolorations. — The commonest metallic stain is due to iron, which may cause either a localized or a diffuse discoloration. The former are due to accidental contact of the goods with iron, the latter to the presence of iron in the water or other assistants used. Iron is, of course, very easy to detect by the Prussian Blue test, either in the fabric itself or in its ash. It may be removed by treating the cotton with dilute hydrochloric acid, oxalic acid or hydrogen potassium oxalate and then washing it with water.

Copper and Lead Stains

Stains due to copper or lead are met with occasionally. When more than a trace of copper is present it may be detected, in the absence of iron, by means of potassium ferrocyanide. A little of the material is burnt to an ash. The ash is treated with dilute nitric acid and the mixture filtered. The filtrate is evaporated to dryness, dissolved in a little water, a few drops of ammonium acetate solution added, followed by a little potassium ferrocyanide solution. If copper be present a red or pink color will be produced.

A more delicate test is that of Callen and Henderson (*Analyst*, 1929, 650) in which sodium diethylthiocarbamate $(C_2H_5)_2N.CS.SNa$ is used. The ash is dissolved in dilute hydrochloric acid, made alkaline with ammonia, the mixture boiled and filtered. The filtrate is cooled and treated with 10 c.c. of a 0.1 per cent solution of the diethylthiocarbamate. In presence of copper a golden brown color is produced.

When lead is suspected the solution of the ash is treated with a few drops of ferric chloride solution, made alkaline with ammonia, boiled and filtered. The lead remains on the filter and the filtrate is tested as described above.

Copper stains are always localized. They are removed by means of a dilute solution of potassium cyanide, with which copper forms a soluble double salt.

Lead stains are met with occasionally. They are usually brownish in color. They are identified by extracting the ash of the stained portion of the fabric with a warm solution of ammonium acetate, adding a little potassium cyanide solution to the extract, then ammonia, until it is alkaline and finally a little sodium sulphide solution. In presence of lead a brown coloration is produced.

The potassium cyanide forms soluble double salts with both iron and copper which do not react with sodium sulphide. Lead stains are removed by treatment with ammonium acetate solution.

The growth of bacteria or moulds.—Raw cotton is a good culture medium for both bacteria and moulds and even pure cellulose is able to support the growth of some kinds of organisms. The conditions necessary for their growth are moisture, suitable food material, a certain degree of warmth and a definite hydrogen ion concentration.

Causes of Organic Growth

Fleming and Thayson (*J.S.C.I.*, 1921, 764A) showed that unless cotton contains 9 per cent of water, organisms do not grow upon it readily. The number of organisms present normally in a sample of cotton was 1.4 millions per gramme. The cotton was incubated for 3 days at 16 deg. C. So long as the moisture was not above 9 per cent no increase in this number was observed. But when the moisture was increased to 10 per cent, 124 millions per gramme were found and with 15 per cent, 499 millions.

Even bleached cotton contains sufficient food material to support the growth of micro-organisms, while unbleached cotton contains much more. Dressed goods are particularly liable to be attacked by bacteria and moulds. This is particularly the case when soap is used as a softening agent, since it produces the degree of alkalinity which encourages the growth of the majority of organisms. The principal causes of bacterial growth are:—

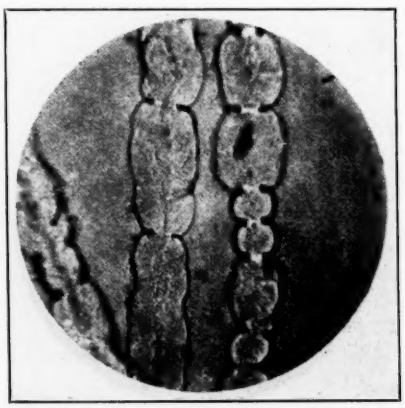
(1) The use of polluted water.
(2) Incomplete removal of the protoplasmic constitutents in the lye-boil.
(3) Allowing of goods to lie about in a damp condition, especially in warm weather.
(4) Insufficient cleanliness of plant and buildings.
(5) The use of inferior finishing materials, such as starch or glue.
(6) Careless storing of finished goods.

The effect of bacterial growth may become apparent as:—

(1) Tenderness.
(2) Discolorations due to chromogenic organisms.
(3) In the case of dyed goods, an altered affinity for dyestuffs.
(4) Decomposition of the dressing materials.

Destruction of Outer Cuticle

The first effect of the growth of bacteria on cotton is destruction of the outer cuticle, which causes abnormal swelling when the hairs are treated with cellulose solvents. If normal cotton hairs are mounted in cuprammonium solution and examined under the microscope, it will be



seen that the insoluble cuticle has become ruptured and globular swellings consisting of the protruding cell wall are formed, as shown in the accompanying photograph.

When the cuticle has been destroyed, the hair swells uniformly since there is no cuticle to offer resistance. Fleming and Thaysen (*loc. cit.*) use a similar test for the quantitative determination of bacterial deterioration. About 0.2 grm. of a representative sample of the cotton is treated with 1.5 grm. of carbon disulphite and 1.5 grm. of 15 per cent sodium hydroxide solution for 10 min. The sample is mixed thoroughly and hairs are mounted on a microscope slide, and a drop of water allowed to diffuse beneath the cover glass. The slide is then examined and the number of hairs counted which appear to be attacked along their whole length. The percentage of them gives a measure of the damage. While damage due to micro-organisms is generally local, it may sometimes be distributed over large areas. The writer investigated a case in which bleached cotton left in a damp condition in a warm atmosphere developed a pink coloration. This was proved to be caused by a mould, which when isolated and subcultured on cotton under the same conditions produced exactly the same effect.

Decomposition of dressing materials.—In the case of dressed goods, discolorations are due, in most cases, to decomposition of the mixing used. Both starch and gelatin are attacked readily by moulds and bacteria, and since they may secrete enzymes capable of hydrolyzing cellulose, tenderness may result. Thin starches, which nearly always contain dextrose, encourage the growth of yeasts and torulae, the latter being often chromogenic. When starches or gelatin have been bleached with sulphurous acid they may produce hydrocellulose and consequent tenderness of cotton. Starches containing dextrose are very liable to turn brown on cotton, owing to the formation of caramel. When the dressing contains soap, fatty acids may be liberated which, if unsaturated, become oxidized to colored hydroxy fatty acids. The same thing may happen to the oil, or it may become rancid and give rise to an unpleasant odor.

Bluing agents are responsible sometimes for loss of color or actual discolorations. The aniline dyestuffs may not be fast to sulphurous acid and become decolorized by the starch used. Ultramarine is decomposed by mineral acids, with the production of a brown color. The writer has seen a starch mixing containing ultramarine, which was of good color when made, become brownish directly the dressed goods were dried, owing to the fact that the thin starch used contained sulphurous and sulphuric acids. Smalt is the only bluing agent which is safe to use in many cases.

Unclassified discolorations and stains.—While many of the causes of damage are capable of being classified there are others which do not permit of it. Aniline stains or those due to tannate of iron are examples. The former are developed when white goods are kept in the neighborhood of others dyed with aniline black. Aniline vapors may volatilize from the latter and pitch upon the exposed surface of the white cotton in the form of a very thin film. In this state the aniline undergoes oxidation and a dyestuff similar to Perkin's mauve is produced.

Technical Notes from Foreign Sources

Stable Diazo Preparations

German Patent No. 438,743 (24/*XII*/'26)—*I.G. Farben-Ind. A.G.*—The preparations cited in this patent are not strictly diazo-compounds, but do yield such compounds when used. The mixtures consist of the mineral acid salts of diazotizable amines, with or without free mineral acid or acid mineral-acid salts, together, with salts of aryl-sulphonic acids, and nitrate, all in dry condition. On solution in water or dilute mineral acid, the amine is diazotized, and is ready for use. The special virtue claimed for these mixtures is, that they keep well even when stored in a warm place (there is no reason why they should not do so, since there would as yet be no diazo compound present).

Easily Soluble Vat Dyestuff Preparations

German Patent No. 441,101 (24/*II*/'27)—*I.G. Farben-Ind. A.G.*—An alteration of G. P. No. 427,997, in which salts of sulphonic acids are used. In this case, instead of such substances, easily soluble carbohydrate, or similar substances, which also under the conditions chosen exert a reducing action, are used. Thus, the dyestuff paste is mixed with dextrine or glucose, and the mixture evaporated, then mixed with alkali and hydrosulphite; for example, 10 parts of dyestuff in paste, 5 parts of glucose, evaporated together to dryness, and mixed with 11 parts of hydrosulphite and 6.5 parts of caustic soda, the whole being finely ground up together in absence of air. On stirring up such a preparation with warm water, the vat is formed quickly.

Vat Dyestuffs of the Azine (?) Group

German Patent No. 433,192 (24/*VIII*/'26)—*I.G. Farben-Ind. A.G.*—In German Patent No. 365,902 and additions, dyestuffs are described which are formed by condensation of p-hydroxyphenazines or naphthosultam-3-4-phenazines with 2-chlor-1-4-quinones, or their substitution products, or with dichlor-4-naphthosultam-quinone. The present patent extends the reaction to non-halogenated quinones. Some of the products are obtained in the reduced condition, and need only gentle oxidation (hypochlorite, for example) to produce the dyestuffs. The three examples describe yellow-green, khaki, and green dyestuffs, which are stated to be fast.

Developed Colors—Carbazole Series

German Patent No. 446,221 (29/*VI*/'27)—*I.G. Far-* claim that hydroxy-naphtho-carbazoles, their homologues, etc., can be used as second components in ice-colors, employing the usual diazo-components and the usual procedures. Five examples (the fifth for printing) are given, employing various carbazole derivatives.

The compounds in general are prepared by reacting hydrazines with naphthol- or naphthylamine-sulphonic acids in presence of bisulphite, and then fusing the products with caustic. (J. Pr. Ch. Bd. 81 (1910), S. 25ff).

Laboratory Conditioning of Textile Samples

Dr. W. Weltzien—Seide 35,482 (1930).—This paper describes and illustrates various more or less convenient means of conditioning samples of materials by means of what we should term "regular" apparatus, as a means of avoiding the setting apart of conditioning rooms, etc. Some good photographs are included, of arrangements of ordinary glass apparatus (jars, flasks, etc.) which would make possible exact conditioning, with little trouble.

International Testing-Standards for Artificial Silk

Walter Koenigs—Seide 35,492 (1930).—A comparative and in some points critical discussion of the standards cited.

Silk Weighting and Swelling of Fibers

Cand. Ing. Hans Pohl—Seide 36,17 (1931).—A supplementary study, complementary to a paper upon the same subject by Heerman and Herzig, appearing in the May issue of Seide of 1930. The author has carried out this further work at the invitation of, and under the direction of, Dr. Herzig.

The author finds that "the swelling (better, the increase in diameter) of the silk, caused by the weighting, increases proportionally as the degree of weighting, within certain limits, if the same weighting-material is used in each case." But he does not confirm the belief of Heerman, that increase in diameter and volume per unit of weighting is the same with mineral and with mineral-vegetable weightings (inorganic and mixed weightings). He finds, e. g., that the increase in volume of the fiber is greater with a tin-phosphate-logwood charge than with a tin-phosphate-silicate charge.

Practical Methods for the Study of the Process of Kier-boiling

W. Minejew and N. Juschkow—Monats. f. Textil-Ind. 45,330 (1930).—A continuation of previous sections of the investigation. This part deals with the barium chloride method of precipitation, and the oxidizability of the liquor with perganganate. Two graphs, interpretative of the authors' results, are given.

Notes on Oils, Fats and Soaps

Dr. J. Davidsohn—Monats. f. Textil-Ind. 45,406 (1930).—Various abstracts from different journals. The first is a well-detailed account of the manufacture of a

soft soap from palm or cocoanut oil, in which the interesting point is brought out that the caustic is best added slowly, in small amounts, to the gently boiling oil, for best results.

Another note deals with German Patent No. 476,151, of 14/VIII/'25, taken out by the Carrara Chem. Pharm. Fabr. The mixture involved consists of beeswax, mineral wax, or other such substances, melted and mixed intimately with alkalies, especially ammonia-water, until an emulsion is formed. To this is added marble-dust (presumably very fine dust) to such an extent that, when the preparation is rubbed between the hands, it crumbles away from the skin. It would seem, in view of the locality of the firm responsible for the patent, that the product might be meant also to utilize an abundant waste-product (marble-dust), though this, if true, would not affect the real value of the product. Cleansing-pastes containing pumics or lava-dust are common and valuable.

Texile Soap Problems

R. Manschke—Monats. f. Textil-Ind. 45,331 (1930).—This valuable and interesting series of papers, some of which have been commented upon in these columns, is concluded in this issue. This section discusses various points connected with the use of oleins as the basis of textile soaps.

Practical Methods for the Study of the Process of Kier-Boiling, Part II

W. Minajew and N. Juschkow—Monats. f. Textil-Ind. 45,407 (1930).—The first part of this paper has been noted above. The first paragraph of this section gives the key to the new section's scope.

"In the discussion of the methods for determination of the caustic and of the carbonated alkalies in the kier-liquors, we have already considered the possibility of attaining this and by means of two separate titrations; one, with phenol-phthalein as indicator, and another, by addition of excess acid and titrating back the excess unneutralized; and we have pointed out that this second titration presupposes the removal of the carbon dioxide remaining dissolved in the liquor, removal which can not be accomplished by simple boiling, since the volatile organic acids also present would be removed at the same time, in part, at least. The question as to how far the carbon dioxide can be removed by aspirating through a current of cold air was in the previous paper left open by us, for further study. We have now carried out this work."

The analytical results and discussions which make up the bulk of the rather short paper make it plain that the method is successful.

Lactic Acid; Its Importance in the Textile Industry

Monats. f. Textil-Ind. 45,89 (1930) *Sonderheft III*).—An extract from a brochure published by C. H. Boehringer Sohn A.G. of Hamburg, the largest and oldest manufacturers of lactic acid in Germany. While, of course, of advertising character, the part extracted is of interest by way of summarizing the many uses of the substance.

Wetting-Out Agents

H. Brandenburger—Monats. f. Textil-Ind. 45,113 (1930) (*Sonderheft III*).—"Of the most varied assistants used in textile finishing, the question of wetting-out agents," says the author, "has probably attained the maximum of interest at the present time. The almost excessive offering of such products by manufacturing chemists shows that the industry must be deeply interested in them. On the other hand, some signs of 'fatigue' in the matter are becoming evident. At the present time, so many and so fundamentally different substances are being offered as wetting-out agents, that it has become necessary to make a rather exhaustive investigation of the characteristic mode of action of the products. It should, further, be noted whether in any case the advantages gained stand in any proper relation to the cost. Any change in the customary method of working is only to be recommended when the advantages afforded are so great that they involve, as a result, either a decrease in cost or an improvement in product."

Looking at such agents as a class, we have to gain some understanding of the limits within which their action will be exerted. In general, the products can be distinguished from each other by the fact that they exert their greatest effort only under certain well-defined conditions. A wetting-out agent which, for example, is effective in concentrated alkaline baths, will either lose its activity, precipitate out, or suffer some chemical change (resulting then in its losing its activity) if used in dilute-alkaline baths, and still more so in neutral or acid baths. Similarly, a wetting-out agent intended for use in an acid bath would show a negative behavior in an alkaline bath. There are plenty of products which display good wetting-out properties in an ordinary bath, whose principal component is mostly water. As soon, however, as such products are tried out in acid or in weak alkaline baths, their wetting-out activity sinks considerably. Then, too, many of them exert a very desirable action if used at ordinary temperatures, or, say, not above 40° C.; if they are used in hot baths, their effectiveness falls. Such products, of course, have their use, under the conditions suitable for them—as a sort of pre-wetting-out agent. But, in case of mercerizing or dyeing, it is of course more rational to incorporate the wetting-out process into the general process itself, rather than go to the trouble of separate pretreatment. For example, in dyeing in a neutral bath, the goods are generally entered at 60°-80° C., and a wetting-out agent which will be most effective at this range of temperature is the one which should be used. Where a boiling bath containing sulphuric acid is to be employed, a wetting-out agent which will not decompose under those conditions (most sulphonated oils will do so) is indicated. If the product, e. g., a sulphonated oil, does decompose, it may

be that under the conditions prevailing no harm will be wrought. If a separation of oildrops takes place only gradually and after long boiling, the product would be suitable for use under such conditions, since usually a comparatively small amount is used, and exists in a considerable degree of dilution. Larger quantities might, of course, give rise to spotting of the goods. Some products do not separate oil, but flocculent matter, which is decidedly more dangerous, in that it may easily flocculate to larger particles and so separate out visibly upon the goods. In alkaline baths, the troubles possible are of a somewhat different nature, owing to the fact that some classes of wetting-out agents, meant for use in neutral baths, simply will not tolerate the alkali which must be present, e. g., in the dyeing of vat colors. In such dyeings, where the material often is of a hard-twist or thick-spun nature, some means must be employed to secure adequate penetration, unless we are prepared to employ a pre-wetting-out or pre-boiling-out. A wetting-out agent, therefore, which is effective in alkaline baths containing hydrosulphite, and which is most active at the bath temperature prevailing, is of very real value.

The trouble with the present situation is simply, that the industry has not yet realized that a wetting-out agent works well only within its characteristic limits, and that more is needed than the power of wetting out ordinary material under ordinary conditions, which would vary according to the personal ideas of the one making the tests. If the wetting-out agent adaptable for one's particular needs is chosen, the products are unquestionably of the highest value.

Fine-Fibered Viscose of Great Softness and Flexibility

German Patent No. 436,792 (9/*XI*/'26)—*I. G. Farben-Ind. A.-G.*—The process consists in adding to the viscose solution different mocous, slimy materials of vegetable origin. Such substances, as infusions of marshmallow root and of flax-seed, have already been employed for this purpose—substances whose mucilaginous properties have long been known and made use of in medicine. The substances particularly recommended in this case are agar-agar, Iceland moss, Semen Psylli, certain seaweeds (Laminarias) other than Iceland moss, salep, etc. Extracts of 1.3 to 1.5% are used, and of these from 2 to 4% by weight, reckoned on the viscose solution. They are to be added before the xanthogenate is added to be dissolved.

Azo Dyestuffs

German Patent No. 436,179 (28/*X*/'26)—*Gesells. f. Chem. Ind. in Basel.*—A new class of dyestuffs, containing the cyanuric acid group. There are 35 examples given, of varied ways of working out of the different lines of synthesis; the general conditions are, that of the original components at least one must contain at least one cyanuric radical, or that a cyanuric halide must be condensed with at least one of the components, which component must possess for that purpose a reactive hydrogen attached to an oxygen, sulphur, or nitrogen atom; such a component also being required to possess at least one azo group already formed. Some of the dyestuffs so obtained by this most general reaction may require finally to be hydrolyzed, reduced, or treated with metallic salts, according to the groups which they contain.

Vat Dyestuffs of Anthraquinone Series

German Patent No. 436,535 (25/*I*/'25)—*I. G. Farben-Ind. A.-G.*—Certain earlier patents, e.g. numbers 264943, 280882, 280883, 379615, 382923, and 394674, cover the production of various thiazoles of the anthraquinone series, some of which are valuable vat dyestuffs dyeing cotton from yellow to orange-yellow, while others are practically worthless, scarcely dyeing cotton from the vat. In this present patent, such thiazoles are nitrated, the products reduced, and in some cases these amino-derivatives acylated. The new products are all good vat dyestuffs, dyeing from yellow to orange-yellow as before, and possessing good fastness and strength. The corresponding nitro-derivatives, unreduced, also act as vat dyestuffs, dyeing mostly from gray-brown to red-brown.—Eight examples are given.

Blue Vat Dyestuffs (Anthraquinone Series)

German Patent No. 438,934 (25/*VII*/'24)—*Scottish Dyes Ltd.*—The fundamental substances are diphthalimimino-anthraquinones, especially the 1-5-isomer; the substances are nitrated, and the nitro products hydrolyzed and reduced, these two reactions being carried out either separately or simultaneously. The products are claimed to be specially valuable for production of blue tones on acetate silk, in fiber or sheet, and also for wool. Four examples are given.

Vat Dyestuffs (Anthraquinone Series)

German Patent No. 436,536 (17/*II*/'25)—*I. G. Farben-Ind. A.-G.*—Amino-anthraquinones or their derivatives are acylated by the etherified radicals of m-hydrozybenzoic acid or its derivatives. Yellow, orange, red, and violet-blue dyestuffs are obtained, of good affinity for cotton, of handsome tones, and of excellent fastness to light. Two examples are given.

Acetyl-Cellulose

H. Rudy—Kunst-Seide 12, 420 (1930).—A supplementary comment upon an article in the journal cited (445, 11, 1929), by Roos and Friese.

The author, basing his views upon a study of the acetylation-process, carried out by him at the Zurich Polytechnic, considers that, first of all, the acetic anhydride and sulphuric acid react to form acetyl-sulphuric acid, $CH_3COO.SO_2OH$, and that this then rearranges to sulpho-acetic acid, $HO.SO_2.CH_2.COOH$, though the existence of this substance has been denied by W. Schneider [Ber. 55, 1895 (1922)], and by Bergmann and Radt [Ber. 54, 1655 (1921)]. The

reverse order of formation, assumed by Roos and Friese, can hardly be possible, as is plain from even purely theoretical grounds; for sulpho-acetic least as far as the C-S union is concerned. The forma- acid, being a genuine sulphonic acid, is fairly stable, at tion of sulpho-acetic acid can be followed up kinetically, directly, by determining the precipitable sulphuric acid from time to time, by addition of barium chloride solution. Acetyl-sulphuric acid is decomposed at once by water (that in which the barium chloride added is in solution), and gives a precipitate of barium sulphate; the sulpho-acetic acid gives no precipitate, and even upon boiling with dilute acids or alkalies splits off no sulphuric acid. The reaction of formation of sulpho-acetic acid is dependent not only upon temperature (at 75-80° the sulphuric acid has disappeared in a few minutes, as already established by the author) but also depends greatly upon the relative proportions of the two reacting components. The more sulphuric acid is present, the more slowly it disappears. In one case, using 2.20 g. of sulphuric acid made up to 100 ccs. with acetic anhydride, only traces of sulphuric acid could be detected after 28 hours; in another case, where 5.20 g. were used, the reaction was complete only after about 5 days. The ratios studied were approximately the same as those given for technical work, a fact which lends additional weight to the results obtained.

In the presence of glacial acetic acid, the reaction goes on more or less slowly, according to the reacting ratios. The general effect of the acetic acid is to slow down the reaction decisively. In the case of such mixtures, which are actually recommended and technically used, the formation of sulpho-acetic acid is of still less extent in the acetylation process itself, where the hydroxyl groups of the cellulose are competing with the acetic anhydride for the sulphuric acid.

It is quite evidently important, in technical work, to make up the acetylation mixture always in the same way, if uniform results are to be expected (whether or not a good or bad acetylation-mixture is being used).

The question of the mechanism of the acetylation-process itself is not yet at all clear. The proposal to acetylate with acetyl-sulphuric acid, in order to avoid the formation of sulpho-acetates, is hardly feasible, according to the author's view, since, especially in the presence of acetic acid, a balanced condition results, in that the acetyl-sulphuric acid breaks down partly into free sulphuric acid and acetic acid, and partly into sulpho-acetic acid. The case is otherwise when the reaction between the anhydride and the sulphuric acid is allowed to go on to the end, and the acetylation then carried out with the sulpho-acetic acid formed. In this case, sulphuric acid as such does not enter the cellulose molecule, but there is a possibility of the formation of cellulose sulpho-acetates. Whether, then, more or less of the sulphuric residue in these groups splits off, is an open question. If genuine sulpho-acetates are really formed, it is doubtful whether this splitting off can take place, since, as mentioned above, sulpho-acetic acid splits off no sulphuric ecid even upon boiling with acids or alkalies (dilute, of course); and this, even if possible, would be even less likely to happen by mere precipitation with water. The employment of sulpho-acetic acid as a catalyzer was patented as far back as 1907 (French Patent No. 385,180). The author has obtained good, sulphuric acid-free, cellulose acetate by its use on the small scale, but declines to commit himself as to its value upon the large scale.—Two graphs are given in the text.

Recent Studies Regarding Micellular Structure

W. Bayerl and K. Roos—Kunst-Seide 12, 424 (1930). —Work has been carried on recently, in the Roentgenographic Institute of Berlin, upon the structure of gelatine, using the already well known Roentgenographic technique. The present paper is a review of this work, which was carried out by Abitz, Gerngross, and Herrmann. The results are considered to throw some light upon the possible structure of cellulose. The conclusions reached may be summarized as follows: the glucose residues or radicals in cellulose are united one to another by primary valences, and these chains, so formed, are further united in parallel position into strands, and these again in similar manner into bundles, through lateral and residual valances. Each of such bundles possesses a crystalline and an amorphous section, which is due to the individual chain-like molecules being united one to another, firmly, only along their middle. At the ends of the chains, the strands are of a variable length, have more or less lost the cohesive condition, and so the condition of strict parallelism. Such a bundle, therefore, possesses in its central portion a crystalline structure, but at the end is of an amorphous, fringe-like structure. This fringe- or brush-like structure at the ends is what imparts the elastic cohesion of the micelles, by a kind of matting together of fringe with fringe, on the different micelles; this matting together being assisted and enhanced by the residual valences present. So, the extraordinary flexibility and slight elasticity of, for example, a cotton fiber may be explained.

The above, it is well to remember, is all deduction from pure assumptions, based upon the Roentgenographs apparently showing that in gelatine there exist crystalline and non-crystalline portions. As a hypothesis, it has its value. It claims to be only a hypothesis, and must not be taken as more than that.

Determination of Degree of Bleaching of Flax, etc.

Dr. A. Klughardt — Monats. f. Textil-Ind. 46, 23 (1931).—An article supplementary to one on the same topic, published in last year's series (45, 212) of the journal cited. In this paper, eight tables and two graphs are given, and the values therein contained discussed.

Testing of Light-Fastness of Dyeings

Dr. H. Sommer—Monats. f. Textil-Ind. 46, 23 (1931). —The first section of a rather important paper from the Staatlichen Materialpruefungsamt of Berlin.

The most striking statement (striking as coming from such an establishment as the one in question) is, that, after all the work which has been carried on as to the value of the various artificial light-sources, we shall have to come back to plain, old-fashioned sunlight as the fading agency. The object of the manifold attempts to utilize artificial light-sources has been, of course, to avoid the inconveniences of variations in weather, season, and so the time required for parallel sunlight tests; and such a light-source as the mercury-vapor arc lamp, it was hoped, promised a way out of these difficulties, but results with that and other light-sources have proved to be uniform only with the use of the same light-source, and in many cases incompatible with the results with sunlight, or even contrary to such results; and, after all, sunlight is the one fading agency (as far as light is concerned) which dyers have to consider seriously.

As to the dependence of the fading effect upon the duration of exposure, to light, Gebhardt has shown that photochemical decomposition of the dyestuff takes place only when a certain "Schwellenwert" of the intensity of radiation has been passed by the rays' action in the fading of the dyestuff. If this value is passed only slightly and for a short time, Ostwald states that a "healing" of the dyeing, a return of the lost color, takes place in the dark; this fact has often been noticed in individual cases, but not established or perhaps thought of as a fact generally true. The exposure-time must therefore be of sufficient duration; the directions of the German Fastness Commission say nothing as to this point, in regard to dyeings upon wool and cotton, but the point is by implication involved in their clear and practical directions for carrying the tests out. In this reference, the type dyeings of the different degrees of fastness serve as a relative measure of the duration of exposure and for the decision as to the degree of light-fastness; the sample is simply exposed to light until the dyeing under test shows a plainly recognizable fading; in reference to the degree of fastness it is then compared with that of the type, which has been exposed side by side with it, and faded to the same degree.

As useful as this standard method is, the procedure is not yet the last word in exact testing and numerical evaluation of light-fastness. In the practical carrying out of light-fastness tests, in such localities as the Testing-Bureau at Berlin, for example, a number of difficulties have made themselves known. As new samples are coming in almost daily to such an establishment to be tested, a type sample must be exposed with every sample under examination, a fact which brings about an extraordinary using up of types, and extended batteries of glass-topped exposure cases. A comparison of the exposed sample with a "scale" composed of type samples exposed for various determinate periods would be a simpler matter. This would presuppose a measurement of the duration of exposure of type and sample; but a statement of the time in hours, weeks or months of a certain season in the year is naturally meaningless, as is also any statement of the number of hours of sunlight, since the irradiative value of sunlight fluctuates so greatly. To attain comparable results, a measurement of the light-energy actually involved in the exposure is necessary. The method of Krais, dating back to 1911 (the use of Victoria Blue R-kaolin paper) the use of "fading-hours", is up to the present the best method available, and is in addition a really good method.

The decision of the worker as to the exact degree or grade of fading, in working according to the procedures of the Fastness Commission, is further rendered uncertain (in the sense of our being able to assign a definite and absolutely accurate numerical value) through the custom of judging by ocular inspection—by the eye only, unaided by any optical instrument of precision. This difficulty becomes particularly evident when one has to judge of the degree of fading of different light tones, or those of very light dyeings. The type samples are dyed to rather great depth of tone; in the wool dyeings, reds predominate, in the cottons the blues; the dyeing up of types in all tones and depths of shade which can possibly occur is on practical grounds impossible. Some optical method of actual measurement of color value must be resorted to. In this connection, the work of Ostwald immediately comes to mind. Prof. Haller has done some more or less successful work along the lines of Ostwald's color theory, and has determined the light-fastness of a number of dyeings expressed numerically to the second decimal place. Three English investigators, Barker, Hirst and Lambert, employing the Lovibond tintometer, have studied the fading of wool dyeings, under artificial light, and have found a relationship to exist between the duration of exposure and the loss of color, according to the formula $T=a.L^2$, in which T stands for time, L for loss of color, and a for a constant characteristic for each dyestuff (we cannot seem to escape from constants for individual cases). They have also proved that, for a given time of exposure, the same amount of dyestuff is destroyed by fading, regardless of the depth of the dyeing. The work now possible with the Zeiss Step-Photometer should make this sort of work more easy and more satisfactory.

Two proposals are now under consideration: one, advanced by Ziersch, the other by Jost and Fluetsch, which are almost complementary to each other in nature; each makes it possible to assign to a given case a numerical value of great exactness.

It seems as though we might ultimately really arrive at a comparatively simple method of exactly assigning an actual, not relative, value to the different degrees of fading, and so be able to fix our standards in an absolute way, which at present is almost only an ideal. But it seems an odd thing that no really satisfactory substitute for sunlight has yet been provided by our scientists.

Refractivity of Fine-Fibered Artificial Silks

Dr. A. Herzog—Kunst-Seide 13, 7 (1931).—A paper containing 4 tables of numerical results of a study of the topic.

The varying thickness, from point to point, of the commercial fibers naturally brings about variation in the degree of the interference-colors observed, so that examination under polarized light is useful only for fibers of fairly uniform thickness, as acetate silk. As a means of measure of the degree of double refraction, the difference between the greatest and the least exponent of the principal refractive indices (specific double refraction, double-refractive index) is generally employed. According to earlier studies of the author, the index-ellipsoid of artificial silks is a rotation-ellipsoid, whose axis of rotation coincides with the direction in length of the fiber. If the longer axis of the ellipsoid is parallel with the axis of the fiber, this axis is designated as optically positive in reference to its direction; otherwise, it is optionally negative. Artificial silks now on the market are optically positive; only acetate silk forms an exception, insofar as it may be optically positive, neutral, or negative, according to the acetic acid content of the acetyl-cellulose. In the neutral case, the rotation-ellipsoid goes over to a circle. Work on this subject was carried out by the author as far back as 1910.

If the fine-fibered artificial silks, now so important, are studied under crossed Nicols, they are at once seen to be distinguished from the coarser fibers through considerably higher-scale interference colors, as would be expected by calculation from their already known refractive indices, a case where mathematico-physical calculation agrees with subsequently observed facts.

The four tables contain some values interesting to those working upon this subject. The author closes with a few general statements, which may be quoted:

1—Fine-fibered artificial silks of commerce are all more strongly doubly-refractive than the coarser-fibered silks of the same kind.

2—The increase in specific double refractivity of the finer-fibered kinds over that of the coarser-fibered ones differs according to the special kind of fiber. It is greatest with cupro-silk (52.4%) and least with nitro-silk (27.3%).

3—In specific double refraction of the fine-fibered silks examined, the nitro-silk stands highest (+0.042); then follow viscose silk (+0.036) and cupro-silk (+0.032). The same relation was observed with the coarse-fibered sorts, viz.: +0.033, +0.025, and +0.021 (in the same sequence).

The principal indices of refraction of the fine-fibered sorts, n_1 and n, which lie parallel to, and crosswise to, the plane of polarization, are less in the parallel position, and greater in the crossed position, than is the case with the similarly orientated coarser fibers of the same kind.

The difference are probably to be ascribed to the effect of tension in the spinning of the fiber.

Insoluble Azo Dyestuffs for Acetate Silk

German Patent No. 450,920 (18/X/'27)—*I. G. Farben-Ind. A.G.*—The first components are amines containing free or combined aldehyde groups, but no sulphonic acid groups. The second components are hydroxy-quinolines or pyrazolones, likewise containing no sulpho-groups. The products may be used as such in the usual ways (disperse dyeing), or generated upon the fiber as developed colors. Those contained in the two examples are very pure greenish yellow or pure yellow dyestuffs.

Azo Dyestuffs of Naphthol AS Series

German Patent No. 453,948 (29/XII/'27)—*I. G. Farben-Ind. A.G.*—(*Addition to G. P. No.* 430,581 *of* 30/*III*/'24).—This addition involves the use of first components consisting of a benzene nucleus substituted as follows: in the 1-position, a hydroxy-group whose hydrogen is substituted by an alkyl, aralkyl, or aryl group, in the 2-position by an amino-group, and in the 4-position by an amino-group whose two hydrogens have been replaced by an alkyl or aralkyl group and by a sulpho-aryl group (SO_2Ar) respectively—a considerable complication, unless the dyestuffs produced from such intermediates show specially valuable characteristics. Such a component would be simply 2-4-diamino-phenol, with the phenolic group etherified, the 4-amino-group mono-alkylated or aralkylated, and the other hydrogen of this amino-group substituted by treatment with, e. g., an aryl-suphonchloride to render it harmless when the free 2-amino-group is diazotized.

The other components of the dyestuffs are of course the Naphthols of the AS series, and the general properties of the products, and the methods of their production, are as usual in that series.

Vat Dyestuffs of Anthraquinone Series

German Patent No. 446,931 (13/VII/'27)—*I. G. Farben-Ind. A.-G.*—Pyrazol-Anthrone Yellow and its derivatives are treated with formaldehyde in sulphuric acid solution. The original yellows are not fast to alkali; the new products are.

Vat Dyestuffs of Benzanthrone Series

German Patent No. 447,556 (26/*VII*/'27)—*I. G. Farben-Ind. A.-G.*—Isodibenzanthrone or its derivatives is treated with chlorsulphonic acid, either as such or diluted with monohydrate, in the presence of selenium or its compounds. In one example, 4 parts of selenium are used to 10 parts of the bezanthrone derivative, and the mixture is left at ordinary temperature for a day, then warmed at 40°-45° C. for half a day, finally diluted with sulphuric acid, and then with water; the precipitated dyestuff is then boiled out with water, filtered, and washed. The products are red-violet in substance, give a blue vat, and dye cotton a bright red-violet color.

Azo Dyestuffs for Acetate Silk

German Patent No. 447, 420 (23/*VII*/'27)—*I. G. Farben-Ind. A.-G.*—The products covered are azo-compounds, unsulphonated, containing one or more beta-hydroxy-ethylamino groups, $HO\text{-}CH_2\text{-}CH_2\text{-}NH$—. This grouping may be brought about in more than one way;

e. g., an amino-azo compound may be treated with ehylen chlorhydrine in presence of a substance which will neutralize the HCl set free, or this reaction may be applied to amino-compounds which otherwise are suitable as second components for coupling. The products are claimed to possess a special affinity for cellulose acetate, and may be applied from aqueous solution, if soluble, or by the disperse method with Turkey-red oil or similar substances, if insoluble. Three examples.

Azo Dyestuffs

German Patent No. 446,496 (*2/VII/'27*)—*I. G. Farben-Ind. A.*—The dyestuffs produced from diamino-diaryl-ureas (the simplest would be formed by action of phosgene upon diamino aromatic compounds in presence of alkali, one of the amino-groups being preferably protected by acetylation, etc.), diazotized (tetrazotized) and coupled to 2 mols of salicylic acid or its derivatives or homologues, are difficultly soluble, and therefore limited in value. Introduction of one or more sulpho-groups into such dyestuffs renders them much more easily soluble (naturally). The sulpho-groups may be introduced by direct sulphonation of the dyestuffs, if that can be done without disrupting the dyestuff molecule, or by starting with diamino compounds, sulphonating, treating with phosgene and alkali (see above), and then tetrazotizing and coupling to the second component, or in any feasible way. Also, dyestuffs derived from a nitro-aniline-sulphonic acid may be gently reduced as to the nitro-group, and two mols of the amino-azo dyestuff so formed linked up to the urea condition by the phosgene reaction. The products are claimed to be specially valuable for dyeing of cotton and wool unions, but little information is given about the matter.

Acid Dyestuffs of Rhodamine Series

German Patent No. 450,820 (*15/X/'27*) — *Durand-Huguenin*—A simplified, or condensed, method, of accomplishing the linking together of an aryl-substituted m-amino-phenol with phthalic anhydride or one of its derivatives, by use of a sulphonating agent (a sulphuric acid suitable in strength for the given case) as condensing and sulphonating agent simultaneously. The series of Biolamines may be so produced. The process is claimed to be cheaper (surely so on the score of labor-hours?) than the older one, in which condensation and sulphonation took place successively, and the products are stated to be redder or yellower, as the case may be, than the Violamines produced by the older method.

Violet Dyestuffs of Triaryl-methane Type

German Patent No. 440,893 (*13/VIII/'27* — *I. G. Farben-Ind. A.-G.*—Tetra-alkyl-diamino-diphenyl-ketones (as Michler's ketone) are condensed with arylated, or arylated and alkylated, ethylene-diamine, which gives basic dyestuffs, and these may be sulphonated, giving acid (sulphonated basic) dyestuffs. The para position of the aryl radicals, para to the nitrogen, must be open. The products are claimed to be clear and full in tone, of strong coloring power, and decidedly fast to washing. Dyeing properties are much like those of the Victoria Blue group.

Black Dyeing of Silk

Dr. S. C., Translated from Textil-Chemiker u Colorist 11, 115 (1930).—Of all colors, black is the one most often dyed upon silk, and it is a fact that more black is dyed upon silk than all other colors together. Black and "color" dyeing are indeed almost different industries. There is more than one large dyeing establishment which dyes silks black exclusively. A few comments upon the topic may be worth making, although, in the absence of any scientific methods whatever, it is not very easy for an experienced black-dyer to instruct another. Dyeing in general rests today upon a truly scientific foundation, but this is not the case with black-dyeing of silk, for here the old empiric attitude is still in force, and it is at present almost impossible to bring order out of the chaos prevailing.

The two materials used for the black dyeing of silk are logwood and iron gallotannate. The process of weighting is closely connected with the black-dyeing process, and the two operations are frequently of the most intimate relation one with another. So, there exists a great number of procedures—"recipes"—which, however they vary from each other in detail, all come down to the same result:—dyeing logwood black upon an iron mordant, or over-dyeing of an iron gallotannate black.

The reason for this great variation in the procedure used in practice lies in the varied nature of the materials form which the logwood black can be produced, as well as the variations in the iron mordants involved, and the tannin used for the gallotannate. Each black-dyer works according to his own formula, which he generally keeps secret, and is convinced that his formula is the best yet worked out. Not one of the many formulæ is actually simple; most of them are so complicated that, in comparison, even vat-dyeing is mere child's play. It is actually astounding to consider how almost everything is brought into such formulæ, and even more astounding when one tries them out.

It is important to remember that, in the trade, we hardly ever come across black, unweighted silks. Although the successful black dyeing of silk is an actual triumph of the dyeing industry, yet no one can say whether the dyeing or the weighting of the silk is the actual purpose of the treatment. Unfortunately, it must be added, that the dyeing procedures are of an astonishing sort, and are valued by their users or devisers in direct ratio to the number of operations required by them, although there exists not the slightest explanation for many of the strange manipulations. It is not possible in brief to go into the relative or absolute value of the countless recipes in use; we only point out a scientific basis for a rational production of a logwood black.

The general rule in practical work is, to use a logwood boil-off liquor, since the use of extracts is avoided, on

account of the dyer's uncertainty as to whether they have been adulterated with chestnut extract and the like. Not the slightest objection can be raised against the use of pure logwood extracts, but the fact is, that the commercial extract is never used in the dyeing of valuable material; yet it perhaps may be used for common blacks or brownish blacks. Although the coloring matter of logwood is very sensitive toward copper, the logwood chips can safely be boiled out in a copper vessel, because, on the first boiling, the part of the metal in contact with the liquor becomes coated with a black film, which shields the metal from further action. If absolutely pure water is used for the boil, the resulting liquor is yellow to brownish-yellow, and that from hard water is reddish-violet; the yellow solution becomes red-violet upon addition of chalk or ammonia. If one works with such a solution, especially the red-violet one, it must be kept from contact with air as far as possible, or the dyestuff will rapidly decompose, going over within 1-2 hours to a dull brown, and then it is no longer fit to use. Since logwood baths are never exhausted, they are always used further; and old baths possess in general greater dyeing power than do fresh ones, since a part of the haematoxylin therein contained has been oxidized to haematin. Black dyeing with logwood is essentially an oxidation-process, since the haematoxylin is oxidized, through the action of the iron salt of the mordant used, to haematin, which latter, in the nascent state, combines with the iron of the mordant to form a blue-black, insoluble lake, the basis of the dyeing. The substance is the actual cause of the blue-black appearance of the dyed silk, but it does not increase the weight of the goods.

Potato Starch—Its Rational Use

F. R.—Faerber-Ztg. 67, 211 (1931).—Cost-calculation, so important and so prevalent today, are in the finishing industry directed principally toward the use of potato starch, and naturally so, it being the cheapest of any starch, therefore most desirable for use, except for its properties not being universally satisfactory. Potato starch pastes up very rapidly, but easily takes up more water than is necessary, so that there is danger of its becoming too watery, and liable to fermentation. The degree of adhesive power desired for a starch paste is also rather low with this product. However, potato starch is very valuable for cutting more expensive kinds of starch, which possess properties differing from those of potato starch, when this cannot be used alone. This compounding of starch pastes would better be undertaken by the finishers themselves, rather than by the manufacturers, for the sake of greater certainty in results, for, in spite of the claims made by the manufacturer of a certain product, the actual user must assure himself of the properties of the product by actual experience, as well as be in a position to make the small modifications in the finishing agent which are sometimes so necessary for a particular lot of goods. In purchasing the different kinds of natural starches, preliminary testing of samples is of course necessary. If a glutinous starch, e.g., corn-starch, is adulterated to any considerable extent with potato starch, the tenacity of the foam formed upon boiling a sample up in water will give a comparatively good idea of the extent of the adulteration. For this purpose, 1 g. of the material is pasted up with a little cold water, the volume brought to 180 cc., and the mixture heated to boiling, the paste so formed being vigorously stirred with a glass rod. If the foam formed remains unchanged when the boiling ceases, the sample consists of a pure glutinous starch. If it goes down noticeably when the boiling ceases, then there is present some less valuable material, as potato or arrow-root starch. If no foam persists, the product is only a non-glutinous material. Such a test, however, affords certainty only within certain ill-defined limits—it is only a rough test of the general quality of the product. Corn-starch prepared by the acid-ferment method is free from gluten. Only examination under the microscope will decide the presence or absence of foreign starches in the product under consideration. Such a careful examination is worth paying for (in case the consumer is not in a position to carry it through), if the above rough test is not sufficiently decisive.

Impurities in the sample are detected as insoluble matter when the starch is "dissolved." The presence of acid is detected by litmus paper. To determine the water content, the usual procedure is employed, drying 10 g. of the sample, first for one hour at 40° C., than for four hours at 120°, and weighing. A content of more than 20% is not allowable. Determination of tenacity or cohesiveness has for some years been carried out by the method of Schreib, consisting in boiling the paste (a small quantity) vigorously for a minute, with vigorous stirring, and letting cool, still stirring vigorously. A starch of ordinary tenacity, tested 4 g. in 50 cc. of water, should give a solid gel. Potato starch paste always possesses lower tenacity than does cornstarch paste, but its value can be raised somewhat by addition of a reasonable amount of cornstarch, still better, of wheat or rice starch. Skill in these mixtures often makes possible the use of the cheap potato starch as the staple, with satisfactory results. A further improvement in the quality of the paste consists in the use of the "opening-up" process, either through purely chemical means, by dilute acids, alkalies, chlorine, etc., or through certain enzymes. Through heating the dry starch to a comparatively high temperature, as we know, dextrine and other soluble products are formed. These modifications of the properties of starch, easily carried out, are now often effected by the consumer, to avoid the need of purchasing a pretreated product at higher cost. Usually the treatment is successful, but now and then a little trouble is met with. The danger consists, of course, in too extensive an alteration of the starch, too much toward conversion into the sugar state, with more or less serious loss of the starchy properties. Then, also, if chemical means are employed for modifying the starch, these reagents in some cases cause damage to the fiber to be treated with the product. Therefore, whenever the

plant is not provided with an adequate laboratory and a skilled chemist for following up the process, the use of sodium perborate is advised. The modification of the starch with this reagent can easily be controlled, since the effect is strictly proportional to the amount of perborate used; and if the ideal conditions are once determined, results can be depended upon with certainty thereafter. About 10-20 g. of perborate are used per kilo of potato starch. The starch is stirred up with the perborate and cold water, warmed to 70° with constant stirring, and then slowly heated to boiling. As soon as the glassy paste runs off "short" from the stick, the process is ended.

Knitted cotton yarns are best finished with a starch paste to which amylose has been added, since such a finishing agent is less liable to "dust," or to gray dark dyeings, or to brown light ones, a danger always present if the darker grades of dextrine are used.

Cotton Piece-Dyeing With Vat Dyestuffs

Karl Wagner—Faerber-Ztg. 67, 103 (1931).—Vat dyestuffs are used very largely today in piece-dyeing of cotton goods. The darker tones are seldom thus dyed, in the piece; it is more the lighter tones which are generally sought. The difficulties are rather formidable; the most exact directions must be carefully followed to attain success. Chiefly, the vat dyestuffs, during application, are much more sensitive to disturbing influences than, for example, the sulphur colors, and in addition are very difficult to improve, if the dyeings come out spotted or streaky. The sulphur colors, equally sensitive to the air, can at least be bleached and redyed if necessary, but with most of the good vat dyestuffs the best that can be done is to treat the goods in a "blind" vat; i.e., the same vat, only without the dyestuff. The details of the process of dyeing are always prescribed and must be, of course, carefully followed; but the machinery must also receive careful attention; this is true mostly only of a broad dyeing upon the jig.

The jig ought to be looked upon, more than it is, as an instrument of precision, in the broader sense. The upper and lower rolls must be absolutely parallel, a condition best attained by a careful use of the spirit level when setting up, and for checking afterward. If the rolls are not truly parallel, the goods will ultimately, during the dyeing, go off on the "tracking," resulting not only on possible positive creasing, but also in the goods, while being delivered from the jig after dyeing, not lying fold upon fold evenly in a symmetrical pile, but with edges overlapping, such areas being exposed more freely to the air, and consequently suffering in depth and tone. According to the experience of the author, the best jigs are those in which the same firm framework carries the bearings of both the upper and lower rolls, the bath or vat to contain the dyebath being set in place inclosing the lower set of rolls. Older forms carry the framework for the upper rolls merely bolted down to the edge of the tub. Under such conditions the parallelism of the rolls, if it ever existed, would easily be disturbed in time, by working loose of the bolts or screws, or even by the swelling of the tub, if the latter, as is usual, were of wood. The wet, the heat, and the weight of the rolls, could cause serious deviation from the original position.

Such matters have a not unimportant influence upon the daily running of a piece-dyeing establishment. In a plant which runs, for example, 25-30 jigs for light tones, the head dyer is obliged to be almost continuously in the sample-room or laboratory, in order to pass upon the samples steadily coming in. In the short intervals between these duties, he is busy looking over the finished runs, and, besides, he is usually in charge of the analytic testing of goods and materials coming in, since at the present time the head dyer is also the technician; he probably has also to enter the records of the work carried out. He therefore cannot often spare the time to form a very adequate idea of the course of the dyeing, or for the working out of improvements in the processes running. If a piece of goods has already been run into the bath of a badly working jig, it is generally too late to undertake any modification of the process; the dyeing must be carried through to the end, although it is certain that they will come out poorly dyed. If the goods are allowed to stop running through the jig at any point during the dyeing, local oxidation will cause spotting, and in such a case the blame for the unsatisfactory results will come upon the head dyer, and ultimately upon the workman directly in charge of that jig. Then there are days when the mechanics or the carpenters must be called upon for small necessary changes or repairs to the machinery. Since these workmen are often needed in other parts of the works, it is usually the case that they cannot be both available at the same time, or at least those cannot come at once who possess the most experience needed for the particular trouble with the jig. And still, the day's regular run must be carried through. Interruptions in the smooth working of the jig mean that the partly dyed goods must lie around exposed to the air, which always means spotting of the goods. Stopping of the rolls while a swatch is under examination means the same trouble. If any additions have to be made during the run, they also demand great care if unevenness in the dyeing is to be avoided. The whole process, in short, must be watched with unremitting care in every detail.

Determination of Luster by Measurement with the Step-Photometer

Dr. H. Sommer—Seide 36, 47 (1931).—A communication released by the State Testing Bureau of Berlin. Does not lend itself to abstracting, being a detailed description of the method of working with the instrument mentioned. The article is illustrated by 7 figures (graphs) and 3 tables.

Color-Measurement in Practical Work

W. Ginzel—Seide 36, 161 (1931).—A discussion of the subject, based upon the use, principally, of the Step-Photometer of Pulfrich (C. Zeiss), based, of course, more or less upon Ostwald's color theory.

Level-Dyeing Dyestuffs for Artificial Silks; Their Constitution and Properties

Dr. Karin Schulze—Seide 36, *pp.* 43 *ff.*, 85 *ff.*, 121 *ff.*, 157 *ff.* (1931).—A review, in 4 parts, of the field covered by the title, with particular reference rather to commercially available, marketed dyestuffs, than to those of merely laboratory origin. The paper approaches the topic from the chemical side, dealing largely with the endeavors of late years to provide dyestuffs which can be depended upon to dye viscose evenly, without special, overstrained precautions being needed. The author's summary, at the close of the final part, is as follows:

1—Among the new viscose dyestuffs there are only few which contain the unsubstituted benzidine nucleus.

2—By use of substituted benzidines as tetrazo-components, negative groups mostly are chosen as substituents. While, formerly, in the common benzidine dyestuffs, the methyl, methoxy, etc., groups were almost exclusively in the 3-3' position, negative groups are now chiefy substituted into the 2-2' position.

3—The employment of the commoner amines of the benzene and naphthalene series as azo-components is much more frequent than of benzidine and its homologues or derivatives.

4—A deeping in tone of already known substantive dyestuffs which dye viscose silk evenly is brought about by substitution of

a—Auxochrome groups, especially with aromatic nuclei (not benzidine derivatives).

b—sulphur.

c—metals.

5—In many cases there is evident a striking relationship between these new viscose silk dyestuffs and the already known acid azo dyestuffs which are used in wool dyeing.

6—Finally, the improvement of the level-dyeing properties of those dyestuffs has mostly been gained at the expense of fastness properties, especially toward water. This fact is certainly related to the situation mentioned under 5.

Violet Basic (Triaryl-methane) Dyestuffs

German Patent No. 441,675 (13/VIII/'27) (*addition to G. P. No.* 440,892 *of* 15/III/'25)—*I. G. Farben-Ind. A.G.*—The new point in this addition is merely the specification of the condensing of di-l-naphthyl-ethylene-diamine with one mol or two mols of 4-4'-tetra-diamino-diphenyl ketone (Michler Ketone type) and, if desired, the subsequent sulphonation of the product, to convert it into an acid dyestuff for wool.

New Patents

New Azo Dyestuffs and Process of Making Same.—(Obtained by diazotizing 4-amino-diaryl-cyclohexane-4'-oxamic acids obtainable, for instance, according to the process disclosed in co-pending application Ser. No. 387,798, filed August 22, 1929, and combining the diazo-compounds with azo-components. These dyestuffs yield on saponification new valuable dyestuffs which may be again diazotized and combined with azo-components, yielding dyeings of clear shades varying from orange to red to violet to yellow to black.) George Kalisher, of Frankfort-on-the-Main, and Richard Fleischhauer, of Frankfort-on-the-Main-Fechenheim, Ger., assignors to General Aniline Wks., Inc., of New York, N. Y., No. 1,810,277, June 16, 1931.

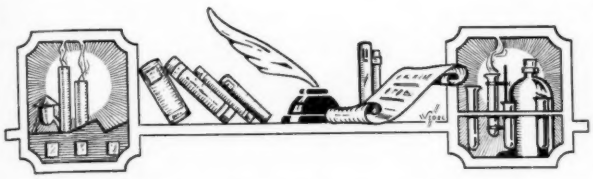
Combined Dye and Stripper.—(Consisting of chemicals that will evolve hydrogen in the presence of water, and strip color from fabrics, and water soluble dyes that will be reduced to leuco bases by the stripping chemicals and that will attach themselves to fabrics and oxidize to the original color on exposure of the fabric to air.) Wolf Kritchevsky, of Chicago, Ill., No. 1,810,661, June 16, 1931.

Combined Dye and Stripper.—Wolf Kritchevsky, of Chicago, Ill., No. 1,810,662, June 16, 1931.

Process for the Manufacture of Derivatives of Vat Dyestuffs.—(Consists in reacting on a vat dyestuff with a quaternary ammonium halide, a metal, a tertiary organic base and pyridine sulphur trioxide. Derivatives possess the property of being capable of employment for dyeing without the usual vat process.) Hugh Albert Edward Drescher, John Edmund Guy Harris, Birkett Wylam, and John Thomas, of Grangemouth, Scotland, assignors to Scottish Dyes, Ltd., of Grangemouth, Scotland, No. 1,810,758, June 16, 1931.

Manufacture of Direct Dyeing Diazo-Dyestuffs.—(Consists in tetraotizing 3:3'-diamino-4:4-dihydroxy-diphenylsulphones and coupling the tetrazo-product with two molecular proportions of arylated 2-amino-5-naphthol-7-sulphonic acids. Cotton dyed directly Bordeaux rose tints becoming violet on treatment with copper sulphate.) Carl Mettler, of Basel, Switzerland, assignor to the firm of J. R. Geigy S. A. of Basel, Switzerland, No. 1,810,839, June 16, 1931.

Trihalogen Arylthioglycolic Acids and Process of Making Same.—(Intermediates for the production of dyestuffs of the thioindigo series obtained by treating trihalogen benzene derivatives with chlorosulfonic acid, reducing to the corresponding mercaptane compounds and condensing with monochloracetic acid. A division of application Ser. No. 262,031, filed March 15, 1928.) Richard Herz, of Frankfort-on-the-Main, Ernst Runne, of Frankfort-on-the Main-Hochst, and Eduard Albrecht, of Frankfort-on-the-Main-Fechenheim, Ger., assignors to General Aniline Wks., Inc., of New York, N. Y., No. 1,811,316, June 23 1931.



RECENT LITERATURE

Annual Survey of American Chemistry. *Vol. V—1930. Edited by Clarence J. West. 629 pages. Published by The Chemical Catalogue Co., Inc., New York City.* 1931. *Price,* $5.00.

This volume, which is the fifth in the series, constitutes a Survey of American Chemistry during the year 1930. It has been published under the direction of the Division of Chemistry and Chemical Technology of the National Research Council. As far as practicable the text has been confined to activities in the United States and Canada but here and there will be found an overlapping into foreign sources largely through the fact that many U. S. Patents have been based on work that originated abroad. The present volume which is much larger than any of its predecessors carries 629 pages.

Each chapter, of which there are forty, covers a definite branch of chemical activity, and an endeavor has been made to assign each subject to a recognized specialist. The Bibliography which accompanies each chapter is particularly valuable running as high as 393 notations in one instance.

The following subjects are covered:

I—Solutions, Victor K. La Mer; II—Kinetics of Gases and Gas Mixtures, F. O. Rice; III—Subatomic Phenomena, Harold C. Urey; IV—Thermodynamics and Thermochemistry, Frederick D. Rossini; V—Colloid Chemistry, F. E. Bartell; VI—Catalysis, Robert N. Pease; VII—Photochemistry, Geo. B. Kistiakowsky; VIII—Physical Methods in Analytical Chemistry, E. G. Zies; IX—The Determination of Crystal Structure by X-Rays, Linus C. Pauling; X—The X-Ray Examination of Materials, Arthur W. Kenney; XI—Application of Electrochemistry, Oliver W. Storey; XII—The Rare Earths, B. S. Hopkins; XIII—Iron and Steel Metallurgy, C. H. Herty, Jr.; XIV—Metallo-Organic Compounds, M. S. Kharasch; XV—Aliphatic Compounds, C. W. Porter; XVI—Carbocyclic Compounds, R. L. Shriner; XVII—Heterocyclic Compounds, Hans T. Clark; XVIII—Carbohydrates, Wm. Lloyd Evans and Melville L. Wolfrom; XIX—Pharmaceuticals, Ernest H. Volwiler; XX—Biochemistry, D. Wright Wilson; XXI—Vitamines, H. C. Sherman; XXII—Icie, G. Macy and Betty Nims; XXII—Water, W. D. Collins and C. S. Howard; XXIV—Sewage, F. W. Mohlman; XXV—Soils and Fertilizers, A. G. McCall; XXVI—Insecticides and Fungicides, R. C. Roark; XXVII—Fermentation, E. B. Fred and W. H. Peterson; XXVIII—Cement and Concrete, John Tucker, Jr.; XXIX—Chemistry of the Silicates, Geo. W. Morey; XXX—Coal, Harry A. Curtis; XXXI—Petroleum Chemistry and Technology, W. F. Faragher; XXXII—Gaseous Fuels, W. H. Fulweiler and E. H. Smoker; XXXIII—Paper, Floyd C. Peterson and Philip L. Hamer; XXXIV—Synthetic Yarns, Chas. E. Mullin; XXXV—Explosives, C. G. Storm; XXXVI—Azo Dyes, M. L. Crossley; XXXVII—Antraquinone Dyes and Intermediates, Robert J. Goodrich; XXXVIII—Rubber, John T. Blake; XXXIX—Paints, Varnishes and Lacquers, V. C. Bidlack; XL—Chemical Economics, Lawrence W. Bass.

The selection of the title for the XXXIV chapter, namely Synthetic Yarns is an unfortunate one since it is a misnomer. A yarn made of rayon fiber is no more a synthetic yarn than one made of real silk or for that matter any other fiber. Stating it another way if one yarn is synthetic there is no reason why all yarns are not synthetic. We believe the term Rayon Yarns would have been more in keeping with the facts, the term Rayon having been quite generally adopted in the United States and Canada and also in England.

This book should be a part of every chemical library and should prove invaluable to the chemist who wishes to keep abreast of the times in such branches of the science as may not be considered strictly his own.

A Twenty-one Years' Chronology Record of Textiles. This volume has been published by the Textile Institute of Great Britain in association with its Coming of Age Celebrations. It is a record of events, inventions and steps in progress made in twenty-one years, from 1910 to the present time. It is strictly a record and in no way critical and no attempt has been made to evaluate any particular machine or device. It is highly illustrated and embodies an extensive chronology and bibliography of important events and articles published in the Journal of the Textile Institute. It is divided into the following sections:

I. Textile Institute History.
II. Contemporary History.
III. Fibers and Their Production.
IV. Yarns and Their Production.
V. Fabrics and Their Production.
VI. Bleaching, Dyeing and Finishing.
VII. Analysis, Testing, Grading and Defects.
VIII. Textile Economics and Welfare.
IX. Textile Research and Education.
X. Textile and General Statistics. This latter section is to be issued as a separate supplement and will be furnished to all purchasers.

The compilation of this book has been made by the editorial staff of the Textile Institute, from information supplied by over two hundred organizations, firms and members. In addition to its general interest it will serve as a highly classified Index to the Journal of the Textile Institute during the twenty-one years of its publication [illegible] should be in the library of every textile establishment and of every individual who has a technical interest in textiles. This volume may be purchased through the Howes Publishing Co. for $1.25.

"Viscose Rayon Production." *By D. L. Pellatt. 236 pages, 69 illustrations. Published by Emmott and Co., Ltd., 65 King St., Manchester, Eng. Price,* $3.00.

This book specializes upon the subject of Viscose Rayon, none of the other types being mentioned. The author has presented an excellent critical description of the process of manufacturing this particular rayon as it exists in practice at the present time and has endeavored to give a balanced account of the materials utilized, processes, organizations, and practical problems of production which face the operatives and management in the industry. While the limited knowledge of the chemistry and physics of the process has been indicated and no attempt has been made to discuss the theory of these sciences as involved in preparation of the spinning solutions and their subsequent coagulation, the procedures involving chemical reactions have been given in a very complete and lucid manner.

The manufacture of viscose rayon constitutes about 84% of the whole rayon industry at the present time and this fiber has attained a stability in its methods of production that permits of a completeness of description which would not have been possible a few years ago. As a result the author is able to give a continuous and authoritative description of the process without any serious omissions.

In only one or two instances is any reference made to the patent literature. This will be an advantage to many readers as many technical books are so involved with patent descriptions and references as to confuse the average reader who has no interest in them. The omission of all historical discussion of the rayon industry has also contributed to compactness of the book so that more space is devoted to the actual manufacturing process than will be found in similar books of a far greater number of pages.

Chapters are devoted to the following subjects:

Problems in the Establishment of Rayon Factories; Productive Labor; Preliminary Considerations of the Disposal of Waste Products; and the Supply of Suitable Water.

Types of Buildings Suitable for Viscose Rayon. The Raw Materials of the Industry. The Preparation of the Viscose Including the Mercerizing of the Cellulose and the Formation of Cellulose Xanthate. Preparation of the Viscose Solution and Its Blending. Ripening and Filtration. Preparation of the Coagulating Liquor. Spinning. Subsequent Treatment of Spun Yarn. Washing After Reeling. Stretch Drying Process. Desulfuring and Bleaching. Hydro-extraction of Bleached Yarn. Final Drying Process. Sorting and Bundling. Ventilation and Air Conditioning Plant. Effluent Disposal. Rayon Staple Fiber and the Spinning of Rayon Staple Yarn.

How Textile Chemists and Dyers Can Help Solve Mill Problems

By Albert H. Grimshaw, M.S., F.A.I.C.
Associate Professor of Textile Chemistry and Dyeing, North Carolina State College

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AT THE present time there are many mills who do not employ a textile chemist, but who do have an experienced dyer. At other mills there is no one in the plant who can run an analysis or do any type of analytical work such as frequently is required. For such mills, the Textile School of North Carolina State College has been able to place at their disposal the research laboratories and services of the instructors and students to quite an extent.

This article will deal with only a few of the problems sent in by North Carolina mills to the school for solution. Also it will deal only with those which were worked out by the department of chemistry and dyeing. The problems varied greatly, but there were several from different mills which dealt with starches, sizing compounds, etc., which will first be taken up for explanation.

For instances: one mill writes somewhat as follows:— "We are having trouble with our slasher blankets wearing out prematurely, and we would like to know the pH of our mix. The mix contains 25 pounds of potato starch, 1 pound of ???? compound, and 110 gallons of water. When you determine the pH, please tell us how much acid or alkali it would take to neutralize the mix of 110 gallons. Of course we do not want our mix on the alkali side and again we do not care to have enough acid present to tender the slashed yarn."

Here is the results as sent to this mill, also the method of working at the school:

The pH was determined by use of the LaMotte Roulette comparator as described in an article "Comparative pH Value of Starches" in the Textile World of September 15, 1928. In this case, the sample showed on the first day a pH value of 6.8; but three days later this had changed to a pH of 6.4. Note—The lower the number, the greater the acidity.

A test was also used by the titration method using the regular method with .1 N caustic soda. From the results of the titration and the pH test, it was calculated that for 110 gallons of the mix that 1.37 ounces caustic soda would exactly neutralize it *at that time.* Of course if the paste was allowed to stand and become rancid, more alkali would certainly be required.

Just a couple of requests from mills in regard to starches: one mill writes:— "We are sending two starches marked A and B, please let us know the pH and percentage ash." These starches were tested for pH as noted above and the results were as follows: Sample A, 6.4 and Sample B. 6.6; the school report said: "Both these samples show only the usual amount of acidity found in modified starches. In this case, the difference between

the two samples is almost too small to measure. A pH of 7 would be exactly neutral."

The ash test was made as explained in an article "Tests on Ash, Grit, Color, Pasting Points, and Lasting Qualities of Starch," which appeared in the Textile World of August 11, 1928. By ignition in a platinum crucible the results were as follows: Sample A, .634% and Sample B, .153%; both being somewhat higher than the average.

Another mill sent in three starches for tests for comparison of viscosity, moisture contents, pH, ash, grit, solubility, and pasting points. The viscosity method is described along with other methods in an article in the Textile World of Oct. 13, 1928: "Ash, Grit and Color and Pasting Point Methods" in Textile World of August 11, 1928; "Moisture and Soluble Matter" in Textile World of July 14, 1928.

The method used in this test for viscosity was by use of caustic soda solution and three different glass funnels. The figures given here were the number of cc. which passed through the funnels in 60 seconds; all compared with water:

	Funnel No. 1	Funnel No. 2	Funnel No. 3
Water	57 cc.	127 cc.	72 cc.
Sample No. 1	42 cc.	97 cc.	52 cc.
Sample No. 2	50 cc.	112 cc.	58 cc.
Sample No. 3	48 cc.	110 cc.	56 cc.

By studying these results you can note that Sample No. 1 was the slowest whereas No. 2 was slightly faster than No. 3, both being faster than No. 1. If this is borne out in practice then Sample No. 2 should penetrate easier than the others under like conditions.

In the tests for pasting points, it was found that Samples No. 1 and No. 2 started pasting at about 65 degrees C. and were fully pasted at 85 degrees C., whereas No. 3 started at about 60 degrees C. and was fully pasted at about 80 degrees C. In this case, there would be a trifle less heat required for pasting No. 3 than for the other two samples.

The tests for ash resulted as follows: Sample No. 1, .345%; No. 2, .57%; and No. 3, .58%. There was not much choice in this test as they were so nearly equal. The ash was not tested for its constituents.

Moisture test in this case was reported as follows: "Moisture on 'as is' basis as samples were delivered to the college: we did not collect the samples and do not know how much precaution was used to obtain *truely* representative samples." Sample No. 1, 13.8%; Sample No. 2, 13.7%; Sample No. 3, 13.3%.

pH test for acidity. Sample No. 1, pH 6.6; No. 2, pH 6.4; and Sample No. 3, pH 6.4. None of these starches were far enough below the neutral point of 7 to show more than a slight trace of acidity. It was not enough to show any action on litmus paper.

Solubility test: Sample No. 1, .580%; Sample No. 2, .495%; and Sample No. 3, .515%. These also ran closely together and made it difficult to pick out the most suitable sample.

Grit test: All reported "not perceptible."

Another interesting problem was sent in by a mill which was having trouble as follows: They dyed their yarn and sized some of it, some was not sized. The sized yarn did not match the other in color later on. The dye used was a vat color. At the school we ran a number of tests and then sent the samples back to the mill so that they could judge for themselves. We used the tallow and starch furnished by the mill which was the same as that which had been used on the uneven samples.

Test No. 1a. Treated the unsized yarn with a mixture of 1 gram of tallow called "A" plus 200 cc. of water at a boil for a few minutes.

Test No. 1b. Treated unsized yarn with a mixture of 1 gram of tallow "A" plus 10 grams of starch and 80 cc. of water.

Test No. 1c. Treated unsized yarn with a mixture of 2 grams of tallow "A" plus 200 cc. of water.

Test No. 2a. Repeated No. 1a using tallow "B."

Test No. 2b. Repeated No. 1b using tallow "B."

Test No. 3. Used the starch without either tallow.

Test No. 4. Treated some of the mill sized yarn with distilled water, filtered and treated the distillate with phenolphthalein indicator which showed a slightly *Alkaline* reaction.

Test No. 4b. Treated some of unsized sample as above, but there was no alkaline nor acid reaction.

Test No. 5. Treated some of mill sample with petrolic ether by extraction to determine whether or not the removal of the fatty matter affected the color. *Did not seem to do so.*

Test No. 6. Treated one end of skein from mill sized sample with a 2% solution, cold, of caustic soda; treated the other end with a cold 2% solution of sulphuric acid.

Test No. 7. Treated unsized sample from mill as in No. 6.

Test No. 8. Treated mill sized sample with same solution, but hot.

Test No. 9. Treated unsized mill samples with the solutions, but hot.

There was some effect on the skeins from some of these tests so the skeins were sent to the mill so that they could be studied and the trouble remedied there.

Two samples of warp sized yarn were sent to the school for the following test. to determine the *Comparative Amount of Sizing.*

As this work was to be comparative, it was decided to try three different chemicals. First, all the skeins were bone dried and weighed and several skeins were used in each test and the average taken. NOTE: It is quite possible that there would be some difference due to the method of sizing and part of the warp from which the skeins were taken, so that it is just as well that the test was only comparative.

Test No. 1. Boil for two hours in a solution containing .5% Aktivin and .5% soda ash based on weight of the goods. Wash well in hot water, then in cold water, and test for presence of iodine with starch.

Test No. 2. Boil for 30 minutes in a solution containing 2 cc. of sulphuric acid per liter wash well in water then in a solution containing 1 gram per 100 cc. of soda ash, then again in water.

Test No. 3. Treat at 75 degrees C. for two hours with 2% Malt Extract plus .2% soda ash. Wash well.

As the iodine test showed presence of starch in all of the above after treating, they were given a second treatment.

Results figured on bone-dry basis:

Sample	Loss Test No. 1	Test No. 2	Test No. 3
No. 1	13.33%	12.61%	10.715%
No. 2	14.534%	13.143%	10.148%

NOTE: As the Malt Extract was not fresh, it might be the cause of its not removing as much as the other tests.

Other tests as made at the school will be described from time to time.

Code of Business Practice

The rules of standards and business conduct for the dyeing and cleaning industry recently adopted at the Washington Trade Practice Conference have been adopted by the National Association of Dyers and Cleaners. This code of business practice sets forth what is to be considered as proper cleaning and finishing, and establishes a code of ethics which governs business practice and seeks to eliminate unfair competition through the proper conduct of one's business.

Copies of the "Code of Business Practice of the Dyeing and Cleaning Industry" may be obtained from the National Association of Dyers and Cleaners at Silver Spring, Maryland.

Gulf Cotton

A ship load of 7,600 bales of cottonseed-hull shavings, the first shipment to Hercules Powder Company from the Gulf Region, was unloaded at Hopewell, Virginia, July 11 and 12. The shipment was made from Houston, Texas, to the purification plant of the Hercules Powder Company at Hopewell, Virginia.

From the cotton by-product, the company manufactures chemical cotton which is used in the production of nitrocellulose, cellulose acetate, rayon, and fine papers.

Government Publications Relating to Textiles

A revised edition of the above publication has recently been issued by the Textile Division. In addition to listing publications on cotton, wool, silk, rayon, furs, wearing apparel, etc., a number of pamphlets and bulletins dealing with dry-cleaning and laundering are also included. These are listed under the following headings: Dry-cleaning, laundering, washing and cleaning materials, wages and labor conditions, insect control, and miscellaneous.

Copies of "Government Publications Relating to Textiles" may be obtained free of charge by writing the Textile Division or from the nearest district office of the Bureau.

New Product

Ammonium Linoleate which is now available commercially at a low price is replacing soap in many cases in preparing detergents, polishes, waterproofing compounds and other emulsions.

Ammonium Linoleate is a soap whose most interesting characteristic is that the ammonia splits off, when exposed to the air, leaving a film of linoleic acid. The latter oxidizes and forms a water insoluble film. It is said that ordinary soaps when used in water-proofing compositions remain as such and, therefore, the finished film is not waterproof.

Many formulae describing the preparation of emulsions of gasoline, naphtha, turpentine, linseed and other oils as well as waxes are furnished free in a handy leaflet by the manufacturers, Glyco Products Co., Inc., Bush Terminal Bldg., No. 5, Brooklyn, N. Y.

The rate for "Position Wanted" advertisements in this column is 2 cents a word—with a minimum of 50 cents per insertion. For all other types of advertisements—i.e., help wanted, machinery or supplies for sale—the rate is $5.00 per column inch or less per insertion.

WANTED

Wanted, practical dyer with experience on jigs, pad and continuous machines on direct sulphur and vat dyes. State age, experience, other details in first letter. Unusual opportunity. Box 682, American Dyestuff Reporter, 440 Fourth Avenue, New York, N. Y.

MASTER DYER

Thoroughly experienced in cotton, worsted, silk and rayons. Skeins, warps, packages, pieces, ribbons, hosiery, etc., on every type of machine. Philadelphia or vicinity desired. Box No. 683, American Dyestuff Reporter, 440 Fourth Avenue, New York, N. Y.

PRINT WORKS CHEMIST WANTED

Wanted—By large Eastern Print Works, Print Works Chemist experienced in printing work as applied to cotton, rayon, silk and wool. Write giving full particulars including previous experience and salary expected to Box No. 684, American Dyestuff Reporter, 440 Fourth Avenue, New York, N. Y.

WANTED

Required a foreman dyer. Must be a good matcher. Experienced with silk and celanese and celanese fabrics preferred. Address reply stating experience to Box 685, American Dyestuff Reporter, 440 Fourth Avenue, New York, N. Y.